EXHIBIT 164

THE UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

IOWA PUBLIC EMPLOYEES' RETIREMENT SYSTEM, *et al.*, Plaintiffs, vs. BANK OF AMERICA CORPORATION, *et al.*, Defendants.	Case No. 17-cv-6221 (KPF)

Reply Expert Report of Paul Asquith and Parag Pathak

October 5, 2021

Highly Confidential

TABLE OF CONTENTS

I. INTRODUCTION AND SUMMARY OF CONCLUSIONS

1. In our Opening Report dated February 23, 2021, we relied on common evidence—economic principles, detailed stock loan transaction data, data concerning the actual-world trading experience of the AQS platform, and documentary and record evidence—to reach conclusions regarding the economic harm suffered by class members due to the Defendants Alleged Conspiracy (herein after referred to as the "conspiracy"), and to conservatively quantify damages arising from this harm on a transaction-by-transaction basis.

2. Using detailed transactions data from the Prime Broker Defendants, we concluded that the Prime Broker Defendants charged a substantial spread between (a) the prices at which they borrowed stocks from agent lenders or beneficial owners and (b) the prices they charged short sellers when lending the same stocks on the same day.

3. We concluded that the Prime Broker Defendants did not create economic value for either stock lenders or borrowers to justify the magnitude of this spread. We also concluded that absent the conspiracy, an anonymous multilateral stock lending platform would have made stock loans available at prices substantially better for borrowers as well as for lenders (with the exception of GC stock), and that such prices would have directly disciplined prices in the over-the-counter ("OTC") market. Through this analysis we concluded that the conspiracy impacted all or virtually all lending and borrowing class members.

4. We also developed a conservative methodology for quantifying the prices at which lenders and borrowers of stock would have transacted in the but-for world absent the conspiracy. Comparing these prices to the prices received by class members in the actual world, we conservatively quantified the damages incurred by class members due to the conspiracy. As set forth in our Opening Report, we calculated positive damages for each Subclass through the application of this damages methodology.

5. In response, Defendants' Experts raise various criticisms of our impact and damages methodologies. Broadly, these arguments are designed to suggest, incorrectly, that (i) the instruments that are borrowed and lent by the Prime Broker Defendants have economic features that make them incompatible for trade on an anonymous, multilateral platform; (ii) various regulatory and capital costs associated with the trade of stock loans on an anonymous, multilateral platform would render platform trade of stock loans uneconomical, and (iii) once

these economic features and costs are accounted for, application of our damages methodology establishes that many class members not only did not suffer injury as a result of the conspiracy, but would have suffered injury had stock loans traded widely on an anonymous, multilateral platform such as AQS.

6. Those criticisms are misguided and rest on a series of significant mischaracterizations and errors.

7. *First*, Dr. McCrary improperly suggests that our damages methodology establishes that the conspiracy did not impact some class members. This analysis reflects a fundamental misunderstanding of the role and scope of our damages model, which is designed to estimate damages, not necessarily to prove class-wide impact. Our damages model does support the claim of class-wide impact by showing positive damages for virtually all class members. At the same time, the damages model makes a number of *conservative* assumptions which *underestimate* damages. Specifically, we conservatively assume *all* transactions would have taken place at the "worst-case" price in the but-for world. This is a practical assumption that causes us to under-estimate class-wide damages. It provides a workable approach to a formulaic allocation of class-wide damages to individual class members.

8. In addition, as we made clear in our Opening Report, while [redacted] it did not reflect the full compression that would be experienced across the market if, absent the conspiracy, robust, anonymous, multilateral trading had become prevalent. Our damages methodology was, accordingly, purposely formulated to provide conservative estimates of the damages suffered by class members irrespective of whether they would have been transacted on a platform or OTC.

9. This conservative assumption does *not* mean that all class members would either receive (Beneficial Owner Subclass) or pay (End-User Subclass) the worst-case price in the but-for world. Many would receive or pay a much better price. But this conservative assumption, as a logical matter, could assign negative or zero damages to individual class members even though, in actuality, those class members were, in fact, injured. Our impact opinion, set forth in our Opening Report, is based on the supply-and-demand framework, the extensive spreads charged

by the Prime Broker Defendants, and the subsequent opinions Professor Zhu has offered in his Reply Report.

10. Defendants' suggestion that "impact" could, or should, be shown through the transactional data available to us is misguided as an economic matter. As the conspiracy did not permit a robust anonymous multilateral stock loan trading platform to develop, no clean period of data is untainted by the conspiracy—i.e. data from the real world that would be informative about how stock loan trading platforms would have affected the market in the absence of the conspiracy. If, for example, the conspiracy had taken place from 2008-2013 and platform trading of stock loans became widespread thereafter absent a conspiracy, an economist could analyze the post-2013 market as a benchmark for what the 2008-2013 market would have looked like in the absence of the conspiracy. But here, we have been asked to assume that the conspiracy has not ended, an assumption that explains why stock lending trading platforms still are not available in the market. As an economic matter, the transactional data we use in our damages analysis undercounts the full impact of the conspiracy on class members, as a result of our conservative assumptions.

11. *Second*, as we detail below in Section IV.A, Dr. McCrary's use of our damages methodology to suggest that a significant number of class members would not have suffered damages rests on a series of egregious mistakes concerning [redacted] Dr. McCrary improperly includes [redacted] Dr. McCrary also incorrectly excludes [redacted] Correcting these data errors and adjusting the weighted average OTC prices used by our damages model accordingly, Dr. McCrary's assertions regarding undamaged class members collapse. Even under Dr. McCrary's measure of damages, the percentage of End-User Subclass members for [redacted] for which we could not calculate damages declines from [redacted] under the cost estimates of our Opening Report; the percentage End-User Subclass members for which we could not calculate damages across all banks declines from [redacted]

12. Further, as we detail in Section III.E, the various cost adjustments Dr. Hendershott suggests in his report rest on selective and unrepresentative citations and a fundamental misunderstanding of the applicable regulations. Once we correct for Dr. McCrary's various data errors and make adjustments to address Dr. Hendershott's criticisms concerning costs, Section IV.C shows that we continue to find positive damages for virtually all class members at both Levels 1 (addressed by Dr. Asquith) and 2 (addressed by Dr. Pathak). Even incorporating these conservative cost assumptions, we calculate total damages of over [redacted] and [redacted] for Level 1 and 2, respectively.

13. *Third*, in order to claim that stock lending is not compatible with multilateral platform trading, Defendants' Experts spend considerable energy mischaracterizing central aspects of both the existing stock lending market and the stock lending market that would have existed but for the conspiracy. As detailed in Sections II and III, Defendants' Experts fail to provide any reliable empirical support for these various criticisms and in many cases their assertions are, once subject to scrutiny and correction, belied by their own analyses. Their mischaracterizations include, among others, the following:

- Over the Counter Trading Would No Longer Exist: A number of their arguments rest entirely on the erroneous assertion that in the "but-for" world stock loans would be traded only on anonymous multilateral platforms. That is not our opinion or, as we understand it, that of Dr. Zhu. To the contrary, as we explained in our Opening Report and in our depositions, and further explain in Section III.A, the but-for world is one of *choice* in which *both* OTC trading and multilateral anonymous platform trading co-exist. This false caricature our Opening Report is a fallacy that runs through many of the arguments advanced by Defendants' Experts.
  - For example, Defendants' Experts claim that certain lenders benefited from name-disclosed trading in the actual world because their reputation for providing more "stable" loans allowed them to capture better lending prices, a benefit that would supposedly be lost in the but-for world. As we discuss in Section II.A, Defendants' Experts have provided no economic evidence of such a pricing benefit associated with lender reputation. Even if there were, such lenders could continue to trade on a name-disclosed basis through OTC venues or name-

disclosed trading mechanisms on electronic platforms in the but-for world to capture benefits, if any, associated with reputation.

– In a similar vein, Defendants' Experts claim that certain borrowers received favorable borrowing prices through name-disclosed OTC trading because it allowed them to be recognized as "priority clients" of the Prime Broker Defendants. Again, as we discuss in Section II.A, Defendants' Experts have provided no economic evidence of such price benefits. Even if, in limited circumstances, this were true, those borrowers could continue to trade on a name-disclosed basis in the but-for world and capture whatever benefits, if any, that their status with certain prime brokers might provide.

- Price Dispersion and Economic Attributes: Defendants' Experts claim our methodology fails to take into account that certain lenders and borrowers received systematically better loan prices than others due to their economic attributes. Not true. As we explain below in Section II.A, once properly evaluated, there is an insignificant amount of dispersion and the dispersion that does exist has no causal relationship to the economic characteristics Defendants' Experts claim it does. More fundamentally, our damages methodology reliably accounts for this dispersion in its estimation of transaction-level damages.

- Economic Services Allegedly Provided by Prime Broker Defendants to Short Seller Clients: Defendants spend significant effort asserting that certain economic benefits and services provided by Prime Brokers to short seller clients make short selling incompatible with exchange trading and renders OTC-traded instruments economically distinct from platform-traded stock loans. Specifically, Defendants' Experts claim the Prime Broker Defendants provided robust recall protection, rerate protection, and preferential "locate" access to short seller clients on stock borrows. Defendants' Experts also claim that prime brokers increase GC utilization with certain agent lenders for access to hard-to-borrow ("HTB") stock. As we establish in Section II.B, these purported services are not as prevalent or valuable as Defendants' Experts suggest. Despite having access to the Defendants' transactional data, Defendants' Experts fail to support any of their assertions with reliable empirical support. Those analyses that Defendants' Experts do offer

establish that Defendants vastly overstate the value of these services. Moreover, as described below, to the extent these services exist, there is no reason they cannot be provided by both OTC trading and by the platform in the "but-for" world.

- Multilateral Platform Evolution: Defendants incorrectly assume that AQS, in the marginalized and underdeveloped state to which it was relegated given the conspiracy, is fully representative of the anonymous multilateral stock loan trading platform that would have existed but for the conspiracy. As we made clear in our Opening Report, AQS, having been subject to the conspiracy and having been forced to abandon its focus on multilateral trading in favor of an interdealer structure, is merely illustrative of the viability and functionality of such a platform. As we explain in Sections III.B and C, AQS, even in its compromised state in the actual world, was comparable to the OTC operations of the Prime Broker Defendants in the stability of its loans and superior in its loan pricing. Defendants' Experts fail to consider the significant degree to which, absent the conspiracy, services such as recall protection, rerate protection, and locates could have been provided by electronic platforms such as AQS or, for *de minimis* costs, by clearing members, and would have continued—to the limited extent such services had any true value—to be provided OTC trading in the but-for world. Similarly, as we discuss in Sections III.C, Defendants' Experts' other critiques concerning non-cash collateral loans, and information leakage, among other purported impediments anonymous multilateral platform trading would face, similarly are baseless and substantially over-emphasize the impact such issues posed.

- Transparency and Competition in the Existing Stock Loan Market: Defendants' Experts incorrectly assert that the existing stock loan market is transparent and competitive. Both assertions are false. As we detail in Section II.C, whatever transparency may exist within Level 1 or within Level 2 of the stock loan market, there is no transparency across the two Levels that would disclose to lenders and end-users the spreads the prime brokers received in each of these bifurcated sub-markets. Similarly, as we discuss in Section II.D, Defendants' Experts fail to establish that there currently is any true level of OTC competition.

- Significant Costs for Platform Trading in the But-For World: Dr. Hendershott asserts that we failed to account for various costs to be borne by clearing firms (including the Prime Broker Defendants) to sponsor the loans of borrowers and lenders on an electronic platform in the but-for world. As we explain in Section III.E, Dr. Hendershott's proposed costs lack any support, misapply various Basel III regulations, bear no relationship to reality, and would make all current stock lending, including OTC stock lending that takes place today, entirely uneconomical.

14. In sum, none of Defendants' Experts' critiques undermines the reliability of our damages methodology. Further, as we demonstrate in Section IV.C, even if we conservatively incorporate Dr. Hendershott's criticisms into our damages methodology, our damages methodology confirms that virtually all class members incurred damages.

15. We incorporate, as Dr. McCrary did in his analysis and report, the data for all six Prime Broker Defendants (Section IV). To minimize differences arising from data construction methods, we have substantially adopted the construction of the Prime Broker Defendants' datasets proposed by Dr. McCrary, but with certain modifications to address significant errors or omissions in his data construction.

16. Using these datasets, we conclude that the aggregate damages for class members across their stock loans through the six Prime Broker Defendants is [redacted] through the date of our Opening Report:

[redacted]

17. Our analysis confirms that virtually all class members suffered damages:

[redacted]

18. Finally, we reject Defendants' Experts' challenges to our model for calculating loan prices in the but-for world. Dr. McCrary questions the weights we assign to Level 1 and Level 2 prices when inferring the loan prices that would prevail in the but-for world, suggesting that instead of using a common weight to all loans within a temperature category, we should have allowed for up to ten different weights for loans of different degrees of "hotness" within the HTB category. Dr. McCrary's own analysis undercuts his claim (Section III.D). When viewed under the three alternative methods presented in our Opening Report, there is no consistent pattern to average weights within the different levels of "hotness" Dr. McCrary proposes. Moreover, there is a considerable range of variation beneath these averages. As we explain in Section III.D, our calculation of "w" is based on objective and sound data and rationales, and Defendants' Experts have not identified a reliable or credible basis for moving "w" in one direction or another.

19. The remainder of this Reply report is structured as follows. In **Section II**, we address the criticisms made by Defendants' Experts that rest upon a mischaracterization of stock lending in the actual world and explain why we conclude that these criticisms are unfounded. In **Section III**, we turn to criticisms that misrepresent the but-for world of platform trading, again establishing our reasons for finding that these criticisms are also unfounded. Given the failure of Defendants' Experts to challenge the validity of our conclusions regarding impact or our methodology for computing damages, we reaffirm our damages model and, in **Section IV**, apply this model to an expanded dataset of stock loans for all six Prime Broker Defendants. **Appendix C** provides a technical appendix on the transactions data we have used from the six Prime Broker Defendants, our calculations of damages for the named plaintiffs, and our response to data-related issues raised by Defendants' Experts.

II. THE CRITICISMS OF DEFENDANTS' EXPERTS MISCHARACTERIZE THE ACTUAL WORLD

20. In our Opening Report, we used a supply-and-demand framework to establish that the Prime Broker Defendants charged an excessive spread between the prices at which they borrowed stock from lenders in the Beneficial Owner Subclass (the "Level 1" market) and lent stock to borrowers in the End-User Subclass (the "Level 2" market).[1] Defendants' Experts claim

[1] Opening Report, Sections VII – XI.

that certain features of the actual world of stock lending invalidate our framework for analyzing market-wide impact and damages:

a) Defendants' Experts claim that prices for stock loans differed systematically between members of each Subclass based upon their economic attributes and that those receiving favorable prices would have been hurt by having to accept prices available on an anonymous electronic platform.

b) They claim that the Prime Broker Defendants provided additional economic services to class members, such as protection to borrowers from recalls and rerates, that would not have been available on an anonymous electronic platform. On this basis, they claim that stock loans at the two levels of the market cannot be economically compared to each other or to loans on an electronic platform.

c) They claim that information about loan prices, trading volumes, and other metrics of stock lending activity were transparent to both lenders (at Level 1 of the market) and borrowers (at Level 2).

d) Finally, they claim the actual world of OTC stock loans benefited from competition.

21. The challenges advanced by Defendants' Experts are unfounded and mischaracterize the actual world of stock lending.

a) Defendants' Experts overstate the extent of any systematic favorable pricing for certain class members. They also fail to demonstrate the alleged favorable pricing was driven by the economic factors they theorize. Moreover, the entities they identify as systematically receiving more favorable prices in the actual world were injured under our analysis of market-wide impact. If any entities received enhanced pricing for *whatever* reasons in the prevailing OTC world, these entities would receive superior prices in the but-for world due to the introduction and discipline of platform competition, and our damages methodology calculates damages for such class members, even with all of its conservative assumptions. (Section II.A).

b) Defendants' Experts have failed to provide reliable economic evidence that services such as recall protection, rerate protection, preferential access to HTB stocks or greater GC utilization were bundled with stock loans at Level 2 or Level 1.

Defendants' Experts have, therefore, failed to establish through economic evidence that stock loans in the actual world came with any features that would make them non-comparable with the loans that would have been transacted in the but-for world. (Section II.B).

c) Defendants' Experts are incorrect in several respects about transparency of stock lending activity in the actual world. They overstate the level of transparency available to both lenders about other lending transactions (Level 1) and borrowers about other borrowing transactions (Level 2). They also fail to recognize that these two levels of the market remained largely opaque to class members operating at the other level. This opacity prevents both borrowers and lenders from being able to identify the excessive spreads the Prime Broker Defendants made (and continue to make) from interposing themselves between lenders and borrowers. (Section II.C).

d) Defendants' Experts are incorrect about the degree of competitiveness that marked stock lending in the actual world. The pricing of stock loans in the actual world reflects the exercise of monopoly power by the Prime Broker Defendants. (Section II.D).

22. None of these four critiques alters our opinions on market-wide impact or damages. We maintain our opinions that *all or virtually all* class members were impacted and that our damages methodology applies a common methodology to compute class-wide damages.

A. Defendants' Experts Fail to Establish that Alleged Favorable Pricing Affects the Validity of Our Conclusions Regarding Market-Wide Impact and Damages

23. Defendants' Experts contend that in the actual OTC world, there were significant differences in the loan prices received by lenders of the same stock on the same day (i.e., on a given "CUSIP-Day") during the Class Period, and likewise, significant differences in the loan prices paid by borrowers on a given "CUSIP-Day" within this Period.[2] Defendants' Experts claim these price differences were not random but instead systematically driven by certain economic attributes of lenders and borrowers, such as a lender's reputation for providing "stable"

[2] McCrary Report, ¶ 120 and Hendershott Report, ¶¶ 50, 72.

loans or a borrower's volume of trading executed through a prime broker.[3] Finally, Defendants' Experts claim that some class members would lose access to this favorable pricing, and would therefore be worse off after platforms are introduced.[4]

24. Defendants are wrong on three accounts: (1) Dr. McCrary's analysis significantly overstates the variation of prices observed at each Level of the market on a typical CUSIP-Day, and with more reliable measures of dispersion, the variation decreases substantially (Section II.A.1); (2) neither Dr. McCrary nor Dr. Hendershott provide any economic evidence that this variation was systematically related to the economic attributes they cited as causal factors for this variation (Section II.A.2); and (3) Defendants' Experts are incorrect about the consequences of this variation; notwithstanding the dispersion in prices at each Level, all or virtually all class members were injured by the market-wide impact caused by the conspiracy (Section II.A.3).

1. Defendants' Experts Significantly Overstate the Price Dispersion Observed in Real-World Stock Loans

25. While Dr. Hendershott presents various charts that purport to address the dispersion of lending and borrowing prices, he does not produce any empirical evidence that attempts to systematically quantify or measure this price dispersion.[5]

26. While Dr. McCrary, unlike Dr. Hendershott, does purport to provide a measure of the price dispersion experienced over the Class Period, he relies on a misleading metric to significantly overstate the observed price dispersion. Correction of Dr. McCrary's analysis establishes that there was a much lower level of price dispersion than Defendants' Experts misleadingly suggest.

27. While Dr. McCrary measures an average price dispersion of [redacted] at Level 1, we conclude that using the appropriate metrics and methodology, this dispersion, measured as the standard deviation of loan prices, is typically between [redacted] and [redacted] between January 1, 2012 and December 31, 2017 (the "Data Period"). Similarly, while Dr. McCrary's

[3] McCrary Report ¶¶ 122-124; Hendershott Report, ¶¶ 51-57, 75-76
[4] Hendershott Report ¶ 334.
[5] Hendershott Report, Exhibit 1.A-C and Exhibit 2.A-C.

attempts to suggest that there was an average price dispersion of [redacted] we demonstrate it was typically only between [redacted] on a pooled basis over the Data Period.

28. A starting premise of Dr. McCrary's report is that there exists "substantial price dispersion in both OTC lending and shorting prices."[6] He alleges that this dispersion means that class members frequently obtain favorable pricing (i.e., a lender obtains higher-than average lending prices or a borrower gets lower than average borrowing prices). He then assumes that this phenomenon leads to significant economic value for certain class members. We do not agree.

29. First, Dr. McCrary uses a fundamentally unreliable and inappropriate measure of price dispersion as a proxy for the potential of favorable pricing. His measure is based solely on the difference between the highest and lowest price, which has been widely criticized by economists and mathematicians as an inappropriate measure of dispersion for decades. Moreover, his method for constructing averages of this measure across stocks and days inflates his estimates of price dispersion further. The more economically reliable and appropriate measure of price dispersion is the standard deviation of prices. This corrected measure shows that Dr. McCrary substantially overstates price dispersion.

30. To measure price dispersion, Dr. McCrary measures the difference (or range) between the maximum and the minimum loan prices (henceforth, "(Max – Min)") observed on a given CUSIP-Day at each Level of the OTC market, i.e., the range of lending prices at Level 1 and the range of borrowing (or shorting) prices at Level 2. Dr. McCrary computes these (Max – Min) ranges for lending and borrowing prices for each stock on a given day, and then averages these ranges across days using the number of transactions on a CUSIP-Day as the weight assigned to that day's range in the average.[7] On this basis he concludes that the weighted average range of OTC lending prices is [redacted] and of OTC borrowing prices is [redacted][8]

31. Dr. McCrary's measure of dispersion, i.e. (Max – Min), has been criticized by the statistics literature for a century: "The simplest possible measure of the dispersion of a series of

[6] McCrary Report ¶ 120.
[7] McCrary Report ¶ 121 & Exhibit D.9.
[8] Further details on Dr. McCrary's methodology for constructing these average ranges are presented in Appendix Exhibit D.9 of his Report.

values of a variable is the actual range, i.e. the difference between the greatest and least values observed. While this is frequently quoted, it is as a rule the worst of all possible measures for any serious purpose."[9]

32. An example illustrates the underlying flaw in this approach. Suppose that a dataset has the following values: a single "1", five thousand "10" values, and a single "1000." Common sense would indicate this dataset reflects a mostly non-disperse set of 10 values, with two outliers: a single "1" and a single "1000." Dr. McCrary's metric, however, would calculate a ***very large*** measure of dispersion: 1000 - 1 = 999. A better metric would capture the fact that the dataset is virtually all 10s and thus is in fact not very disperse.

33. Unlike a statistically reliable estimate of dispersion, as we observe more data points on prices through additional transactions Dr. McCrary's (Max – Min) approach fails to measure the true dispersion in prices more accurately. If additional transactions occur at prices close to the average, indicating less dispersion in prices, the (Max – Min) range does not decrease. Indeed, (Max – Min) can only increase or stay the same as the sample of price points increase. Dr. McCrary's (Max – Min) estimate of dispersion, therefore, mechanically increases with a larger sample of prices on which it is estimated. Rather than having a more accurate measure of dispersion with more data, the measure becomes more unreliable.

34. This serious flaw in Dr. McCrary's (Max – Min) approach is further amplified by the manner in which Dr. McCrary computes his estimates of the average (Max – Min). Dr. McCrary computes the average (Max – Min) range by giving greater weight to those CUSIP-Days with a greater number of transactions. As discussed, the (Max – Min) range used by Dr. McCrary tends to increase mechanically as we observe more transactions on a given day, regardless of the tightness among prices in these transactions. Therefore, by giving greater weight to ranges for CUSIP-Days with more transactions, Dr. McCrary further overstates his measure of dispersion by giving greater weight to CUSIP-Days when (Max – Min) is likely to be mechanically higher due a greater number of transactions being observed.

35. To remove these misleading biases, we correct Dr. McCrary's calculation in **Exhibit II.1** and compute dispersion by taking a simple average across stocks. The simple

[9] Yule, G. Udny, "Measures of Dispersion, Etc." An Introduction to the Theory of Statistics, 6th Ed. Enl., 133–56, at 133, London: Charles Griffin & Co. doi:10.1037/13554-008 (1922).

average, which does not amplify values for stocks that have more transactions, results in an average (Max – Min) that is much smaller than the biased average quoted by Dr. McCrary. For example, at Level 1, the average (Max – Min) [redacted] per Dr. McCrary to [redacted] on a pooled basis, across all six Prime Broker Defendants. At Level 2, the dispersion [redacted] per Dr. McCrary to [redacted] on a pooled basis.[10]

EXHIBIT II.1
SIMPLE AVERAGE OF THE DIFFERENCE BETWEEN MAX AND MIN PRICES
BY LEVEL (IN BPS)
2012-2017

[redacted]

Notes: Updated Prime Broker Transactions Datasets.

36. As this Exhibit underscores, reporting the average of (Max – Min) range as a summary measure of pricing dispersion, as Dr. McCrary has done, does not make sense when the distribution of the (Max – Min) is skewed. The simple average as a summary measure of central tendency is easily influenced by extreme values and is usually only appropriate in situations when the underlying distribution is symmetrical. The median, which is the middle value of the dataset, has the property that half of the observations are less than the median and half of the observations are greater than the median. The median, thus, provides a more accurate measure

[10] This analysis is based on our Updated Prime Broker Transactions Datasets. See Section IV for our discussion of this dataset and our Updated Pooled Prime Broker Dataset.

of the central tendency of the distribution when, as here, there are outliers or when the distribution is skewed.

37. **Exhibit II.2** below continues to use Dr. McCrary's (Max – Min) as a measure of dispersion in prices for a stock, but takes the median of this measure across CUSIP-Days, rather than the average, to represent the typical dispersion in prices at Level 1 and Level 2. The dispersion [redacted] again: at Level 1, even using Dr. McCrary's (Max – Min) approach, the estimate [redacted] to [redacted] on a pooled basis; at Level 2, the estimate [redacted] from Dr. McCrary's [redacted] to [redacted] on a pooled basis.

EXHIBIT II.2
MEDIAN OF THE DIFFERENCE BETWEEN MAXIMUM AND MINIMUM PRICES
BY LEVEL (IN BPS)
2012-2017

[redacted]

Notes: Updated Prime Broker Transactions Datasets.

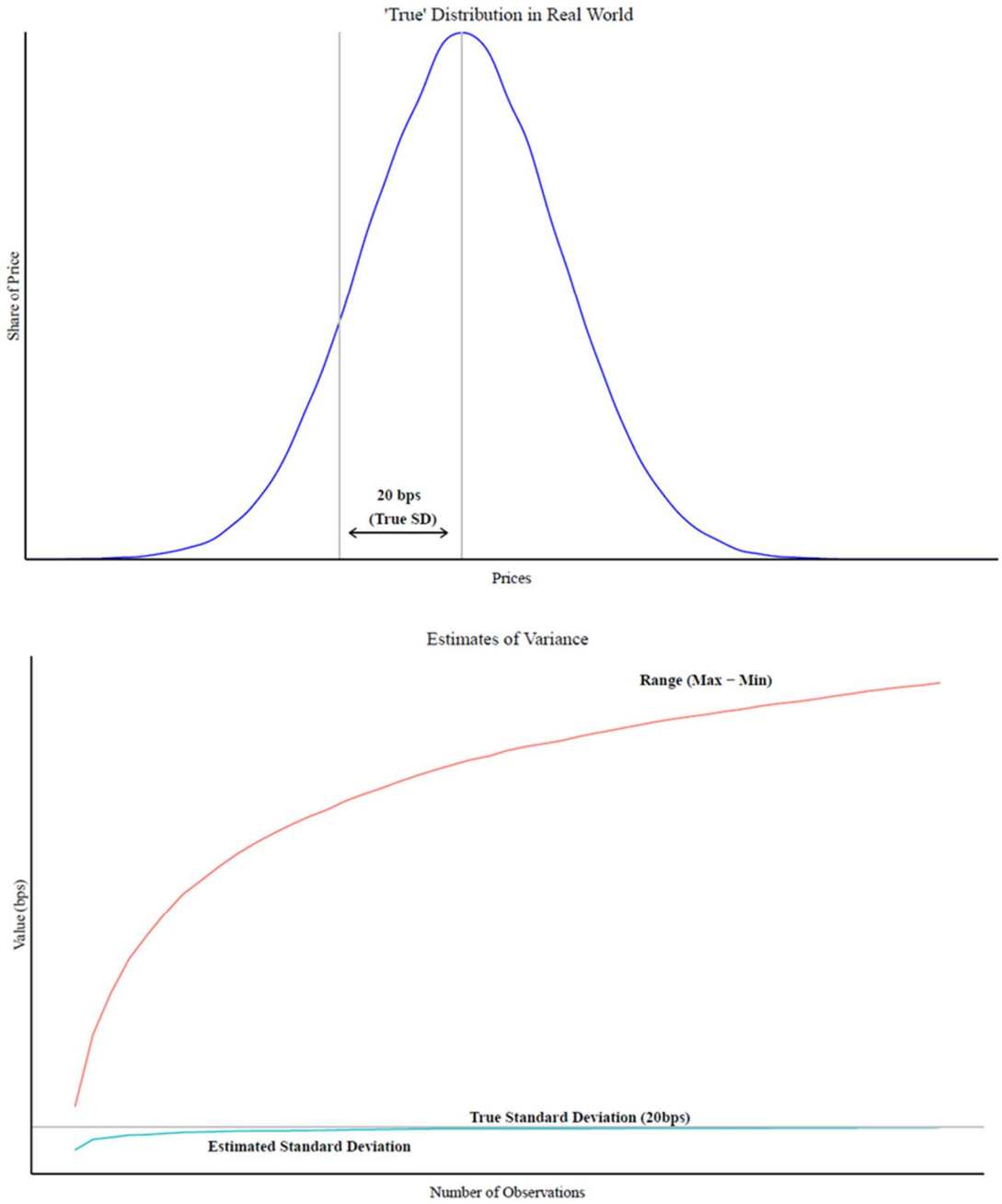
38. The fact that the mean and the median are so different confirms that the distribution of (Max – Min) is skewed across CUSIP-Days. For example, the average (Max – Min) for [redacted] in 2012 is [redacted] for the End User Subclass at Level 2, while the median is [redacted] at Level 2. A median of [redacted] means that more than half of CUSIPs in the dataset have a (Max – Min) that [redacted] The large difference between the mean and median as

summary measures indicates that there are a few large observations in the tail of the distribution of (Max – Min) driving the average. Our correction to Dr. McCrary's analysis merely, thus, moderates the bias of how the "typical" measure of (Max – Min) is computed across multiple stocks and trading days. We now address the biases inherent in (Max – Min) itself as a measure of price dispersion.

39. As discussed, a desirable measure of dispersion reflects not only the extreme prices on a day but all prices. The standard deviation is such a measure: it is the square root of the average of the (squared) deviation of all prices from the mean price. If the data points cluster around the mean value, the standard deviation will be small. If the data is dispersed, standard deviation will be large. Returning to our hypothetical example of a single "1" value, five thousand "10" values, and a single "1000" value, the standard deviation of values is approximately 14. If, on the other hand, there were only three "10" values (along with the "1" and the "1000"), then the standard deviation is 443.8, consistent with the set of values being more dispersed. Thus, the standard deviation reflects the dispersion of all prices observed on a CUSIP-Day. It also has the desirable property that the estimated standard deviation will converge to the true standard deviation as the number of transactions on a given CUSIP-Day increase.

40. We further illustrate this principle in the example set forth below in **Exhibit II.3**. Assume that prices are drawn from a normal distribution where the true standard deviation is 20 bps. The estimated standard deviation will converge to 20 bps as the number of observations increases. Thus, the estimated standard deviation of prices becomes more precise as we have larger samples of transactions. This is in contrast to the (Max-Min) measure which becomes larger as the number of observations increase, as shown as the upper line in the Exhibit.

EXHIBIT II.3
COMPARISON OF STANDARD DEVIATION TO (MAX – MIN) AS MEASURES OF DISPERSION



Notes: Graphs created using simulated data based on a normal distribution with mean of 100 and standard deviation of 20. The simulation was run 1,000 times using random draws of up to 50 observations.

41. As set forth in **Exhibit II.4** below, the average standard deviation of prices at Level 1 and 2 for each of the Prime Broker Defendants are, in fact, much tighter than Dr. McCrary misleadingly suggests.

EXHIBIT II.4
AVERAGE STANDARD DEVIATION OF PRICES
BY LEVEL (IN BPS)
2012-2017

[redacted]

Notes: Updated Prime Broker Transactions Datasets.

42. Properly accounting for the skewness in measures of dispersion by using the median of the price standard deviation across CUSIP-Days results in a much more accurate measure of dispersion. Ultimately, contrary to Dr. McCrary's (Max – Min) measure of [redacted] at Level 1, we demonstrate in **Exhibit II.5** that the standard deviation is between [redacted] over the Data Period, years 2012-2017. At Level 2, while Dr. McCrary's measure is [redacted] we demonstrate it is, in fact, between [redacted] on a pooled basis from 2012-2017.

EXHIBIT II.5
MEDIAN STANDARD DEVIATION OF PRICES
BY SUBCLASS (IN BPS)
2012-2017

Notes: Updated Prime Broker Transactions Datasets.

2. Defendants' Experts Fail to Demonstrate That Favorable Pricing Is Systematically Related to the Economic Attributes of Class Members

43. After presenting his misleading analysis of price dispersion, Dr. McCrary purports to demonstrate that "[redacted]"[11] Similarly, Dr. Hendershott presents empirical results he claims demonstrate "[redacted]"[12]

44. We do not challenge Defendants' raw statistical results on this issue, but we do challenge the inferences drawn from them. Defendants' Experts have not shown their theories about certain economic factors like client trade volume cause differences in prices. The presence

[11] McCrary Report ¶ 122.
[12] Hendershott Report ¶ 57.

of these price differences is more consistent with our explanation that it stems from an opaque and non-transparent market.

45. For example, Dr. McCrary theorizes that "OTC shorting prices reflects [redacted]"[13] Dr. Hendershott similarly speculates that "prices can vary based on [redacted]"[14] But neither expert empirically connects the existence of favorable pricing to the economic attributes they theorize are driving their results. Below, we show using the best available data, that many of their theorized causes for favorable pricing do not hold under empirical scrutiny.

46. Defendants' Experts claim that over the Class Period, certain lenders received systematically better (i.e., higher) loan prices on their stock loans than others lending the same stock and that, likewise, certain borrowers were charged better (i.e., lower) on their stock loans than other borrowers. Dr. McCrary reports that approximately [redacted][15] Dr. Hendershott states that having analyzed "[redacted]" he found that [redacted][16] Dr. Hendershott also identifies [redacted][17]

47. Defendants' Experts claim that these systematic differences in the loan prices were attributable to certain economic properties that differentiated them from other lenders and

[13] McCrary Report ¶ 123.
[14] Hendershott Report ¶ 51.
[15] McCrary Report, Exhibit 6.
[16] Hendershott Report ¶ 57.
[17] Hendershott Report ¶¶ 75-76.

borrowers. Among borrowers at Level 2 of the OTC market, Defendants' Experts claim that the loan prices charged to borrowers can depend upon their trading volume, their use of overall services across the prime brokerage division, the client's investment strategies and other client-specific factors.[18]

48. Among lenders at Level 1 of the OTC market, Defendants' Experts hypothesize that lenders with a reputation for "stability," i.e., for recalling or rerating their loans less frequently would have commanded better (i.e., higher) loan prices at Level 1. Dr. Hendershott identifies "some [redacted] such as [redacted]" as providing a [redacted] for their loans.[19] Additionally, Dr. Hendershott suggests [redacted][20] Dr. Hendershott also hypothesizes that [redacted][21]

49. However, Defendants' Experts rely entirely upon statements in the documentary record and upon their own economic theorizing to assert these supposed economic determinants of loan pricing. They make no effort to establish any empirical basis, from the extensive transactions data provided in this matter, that differences in loan prices were indeed attributable to these systematic economic attributes of lenders and borrowers. Thus, Dr. Hendershott identifies [redacted] and [redacted] Dr. Hendershott identified [redacted] as an example of a large agent lender whose larger base of customers (i.e., beneficial owners) would allow them to

[18] McCrary Report ¶ 123, Hendershott Report ¶73.
[19] Hendershott Report ¶ 54.
[20] Hendershott Report ¶ 52.
[21] Hendershott Report ¶ 55-56.

provide greater loan stability and thus command better prices, but offers no evidence on whether [redacted] did, in fact, receive better-than-average lending prices.

Analysis of Pricing at Level 1

50. To evaluate the assertions of Defendants' Experts regarding favorable pricing, we first test whether lending volume influences whether some class members receive favorable pricing. If the size and stability of a lender's loan portfolio mattered to the extent that Defendants imply, one would expect the largest—i.e. best—lenders to receive the best pricing.[22]

EXHIBIT II.6
LEVEL 1 COUNTERPARTY RELATIONSHIPS

[redacted]

Note: Updated Prime Broker Transactions Datasets and Updated Pooled Prime Broker Dataset. The [redacted] was calculated for each CUSIP-Day across all 6 Prime Broker Defendants. The [redacted] to determine the average and median difference. Identification of [redacted] follows the same method used in the McCrary Report. [redacted]

51. **Exhibit II.6** presents an analysis of whether [redacted] This

[22] To minimize disagreements arising from differences of classification, we have adopted Dr. Hendershott's classification of the lending accounts associated with certain major agent lenders and report our results for all such agent lenders explicitly identified under his classification.

measure of favorable pricing coincides with the measure used by Dr. Hendershott in Exhibit 3.A, where he compares whether a client paid a different price than the weighted average price.

52. Exhibit II.6 confirms Dr. Hendershott's result that [redacted] with the additional detail that [redacted] and [redacted] as Dr. Hendershott stated, [redacted]

53. As for [redacted] and [redacted]

54. [redacted]

55. Second, we test Defendants' hypothesis that certain lenders received a premium for providing "stable" loans that were not recalled. [redacted][23]

[23] [redacted] Tr. 263:24-264:18.

56. Third, we test Dr. Hendershott's hypothesis that agent lenders seeking higher utilization (of loanable shares) would have been willing to accept lower lending rates to achieve this utilization. However, this explanation [redacted]

EXHIBIT II.7
LEVEL 1 COUNTERPARTY PRICE DIFFERENCES ACROSS PRIME BROKER DEFENDANTS
COMPARED TO GC UTILIZATION - ALL STOCKS

[redacted]

Note: Updated Prime Broker Transactions Datasets.

57. For each prime broker, Exhibit II.7 [redacted] For example, consider a point where GC utilization is 30% and the average difference is 20 bps. In this case, 30% of the prime broker's loans are GC loans, and the prime broker has paid 20 bps more on average than what that agent lender has charged on that CUSIP-Day for all of its loans. If utilization-driven agent lenders were receiving lower than average loan prices to drive higher GC utilization, we would expect to see lower-than-average prices earned on all stocks. [redacted]

EXHIBIT II.8
LEVEL 1 COUNTERPARTY PRICE DIFFERENCES ACROSS PRIME BROKER DEFENDANTS
COMPARED TO GC UTILIZATION - HOT STOCKS

Note: Updated Prime Broker Transactions Datasets.

58. **Exhibit II.8**

59. Finally, Dr. Hendershott suggests that lower-than average lending rates on certain loans might be explained by lenders entering into exclusive lending relationships, with minimum guaranteed payments that allow lenders to seek lower loan prices on each loan under the relationship.

[redacted]

60. In addition to the variation in pricing between different lender accounts, Dr. McCrary notes that the large agent lenders with multiple contracts sometimes lent the same stock at different prices on the same day under these contracts. Dr. McCrary quantifies the range of prices paid by an agent lender across its active contracts using his (Max – Min) range, reporting ranges as large as [redacted] on average for [redacted] and [redacted] on average for [redacted] [redacted][24]

61. For the reasons we have explained, Dr. McCrary's (Max – Min) measure significantly overstates price-dispersion across an agent lender's contracts for the same stock. When evaluated at the median value, a better measure because the distribution is skewed, we find that the median (Max – Min) range for an agent lender on a CUSIP-Day is, in fact, [redacted][25]

62. The superior measure of dispersion, the average standard deviation of prices, indicates as set forth in **Exhibit II.9** below that [redacted] However, as we have noted, measures of dispersion are skewed. Therefore, in Exhibit II.9, [redacted] As with Dr. McCrary's (Max – Min) range, the [redacted] As a further yardstick for the dispersion in prices, we also report the 80th percentile of standard deviations across all the CUSIP-Days on which an agent lender had outstanding loan contracts. We find that even this value, deliberately chosen to represent CUSIP-Days with high dispersion

[24] McCrary Report ¶126 and Exhibit 7. Dr. McCrary appears to have advanced this analysis under a misunderstanding regarding our Opening Report. Dr. McCrary claims that we attributed differences in the pricing of stock loans to differences in the information available to different class members in the actual world. However, the paragraph he cites (¶ 73 of our Opening Report) makes a different point. Contrary to Dr. McCrary's representation, we say "There can be variability in the rebate rate or loan price for the same stock loan even on the same day. This occurs in part due to intraday shifts in supply and demand, but also because the market's opacity allows prices charged to borrowers or received by lender to differ at the same point in time." Opening Report ¶73.

[25] [redacted] eliminating dispersion by definition. However, Dr. McCrary includes [redacted] it does not change his definition of Max – Min. Therefore, we retain [redacted] in our analysis as well.

relative to other CUSIP-Days, [redacted] Therefore, while we accept that agent lenders can loan the same stock on the same day at different prices, we conclude that [redacted]

EXHIBIT II.9
AGENT LENDERS PRICING FOR LOANS ON THE SAME CUSIP DAY
2012-2017

[redacted]

Notes: Prime Broker Transactions Datasets in our Opening Report and Pooled Prime Broker Dataset in our Opening Report. The third column ("Wtd Avg. (McCrary Ex 7)") is from McCrary Report, Exhibit 7. McCrary Exhibit 7 weights the differences by count of positions on a CUSIP-Day.

63. Fundamentally, the variation in prices we observe in the stock loans of the same agent lender is incompatible with Dr. McCrary's claim that price differences arise from differences in the economic attributes of lenders. In his overview of stock lending, Dr. McCrary notes that although beneficial owners are often represented by their agent lenders when making stock loans, "it is generally the agent lender that makes decisions about the terms of the loan, and it is therefore the agent lender's relationships with borrowers that are of primary importance for the pricing of OTC lends."[26] The economic attributes of an agent lender are the same on a given day, and therefore invariant across the different contracts through which they lend the same

[26] McCrary Report ¶ 53.

stock. It is not possible to explain any differences in lending pricing across these contracts based upon the economic attributes of the common agent lender behind these loans.

64. Taking an alternative path, Dr. McCrary suggests that the differences in loan prices of the same agent lender reflect "[redacted]"[27] However, when a prime broker is transacting with an agent lender, the identity of the beneficial owner whose shares are being lent is typically not revealed at the time the stock loan is initiated; it is provided after the stock loan has been consummated in accordance with the requirements of the Agent Lender Database ("ALD").[28] Since the identity of the underlying beneficial owner is typically not disclosed at the time of the transaction, it is not clear how the beneficial owner's identity could have been reflected in the lending prices paid by the prime broker for same shares across different contracts.

65. In conclusion, Defendants' Experts have failed to provide any evidence from stock loan transactions data that any differences in lending prices for stock loans during the Data Period were attributable to the economic factors they cited as drivers of such price differences.

66. Based on our investigation of Defendants' Experts unsupported assertions, we again conclude (as we explained in our Opening Report) that the [redacted] in the actual world is "strong evidence suggesting that, in the existing OTC market structure prices are not competitive."[29]

Analysis of Borrowing Pricing at Level 2

67. Next, we examine the price differences arising between borrowers at Level 2 of the OTC market. As noted above, Defendants' Experts claim that the prices paid by borrowers reflected the borrowing client's trading revenues, its trading strategies, their use of overall services across the prime brokerage division, and other client-specific factors. The anonymization of client identities at Level 2 makes it infeasible to identify most of these claimed pricing factors. However, it is possible to observe the total level of stock lending activity conducted by an anonymized client account with a particular Prime Broker Defendant and it is

[27] McCrary Report ¶ 128.
[28] "The A-Z Guide to ALD", SIFMA, December 7, 2006, pp. 7-8, available at http://www.sifma.org/resources/general/agency-lending-disclosure
[29] Opening Report ¶ 116.

reasonable to expect under the hypotheses of Defendants' Experts that, barring other differences, clients conducting a greater volume of stock lending activity through a Prime Broker Defendant would receive better (i.e., lower) borrowing prices than average from that Defendant.

68. **Exhibit II.10** tests this hypothesis. For each Prime Broker Defendant, we identify the ten largest Level 2 client accounts in terms of total notional volume traded over the Data Period. We compute the difference between the loan prices paid by this client and the Prime Broker Defendant's weighted average loan cost at Level 2 for the same stocks on the same days. We take the average amount by which the client's loan cost for a CUSIP-Day is better or worse than the Prime Broker Defendant's average loan cost across all of its clients for the same CUSIP-Day. If the average is negative, the client is paying lower (i.e., better) prices for its borrowed stock. If the difference is positive, the client is paying a worse-than-average price.

EXHIBIT II.10
NOTIONAL VALUE AND DIFFERENCE BETWEEN BORROWER'S LOAN COST AND AVERAGE LOAN COST
TOP TEN ACCOUNTS FOR EACH PRIME BROKER DEFENDANT

[redacted]

Notes: Updated Prime Broker Transactions Datasets. Size of client determined by sum of notional value from 2012 – 2017. We calculated differences between the client's loan cost and the Prime Broker Defendant's weighted

average loan cost for each transaction. We then estimated the average of the differences by client for each Prime Broker Defendant.

69. The analysis set forth in this exhibit shows that [redacted] For example, [redacted] The claim that other trading activities or client-attributes explain these pricing patterns is entirely speculative—the available data does not permit such inferences.

70. In summary, as with price differences between lenders at Level 1, Defendants' Experts have provided no empirical evidence to support their hypotheses that the economic attributes of borrowing clients explained any differences in the pricing of stock borrows at Level 2 of the OTC market during the Data Period.

71. Having seen no evidence to support Defendants' Experts assertion that heterogeneity in the economic attributes of class members explained variations in the pricing of loan contracts, we maintain that the empirical evidence is more consistent with our explanation that such price differences arose due to the inherent opacity and lack of competition in the OTC stock loan market.

3. Defendants' Experts Fail to Demonstrate That Class Members Receiving Favorable Prices in the Actual World Would Fare Worse in the But-For World

72. Defendants' Experts claim that considering the favorable pricing, on average, received by certain borrowers or lenders in the actual world, it is likely that at least some class members would have obtained worse prices than those they obtained in the actual world.[30]

73. The impact analysis set forth in our Opening Report demonstrates that *all or virtually all* class members would be better off, as platforms generate additional competition in the market that helps both those trading on platform and those that remain OTC. Defendants' Experts' unsupported assertions concerning preferential pricing do not change the opinions set forth in our Opening Report and we stand by our original opinions that all or virtually all class members were impacted by the conspiracy.

74. Furthermore, our damages methodology explicitly took the dispersion of loan prices between borrowers and lenders into account when computing the damages suffered by class members. Our methodology computed damages on a transaction basis by comparing the loan price that would have been obtained by the lender or borrower in our theorized but-for world to the loan price they actually paid on that transaction. Therefore, if one entity received a more favorable price than another on loans of a particular stock on a certain day, the damages this entity would incur on this loan under our damages methodology would be lower.

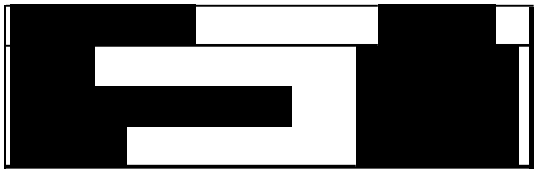
75. Indeed, when we apply our damages methodology to the class members identified by Drs. McCrary and Hendershott as having received consistently favorable prices in the actual world, we calculate damages in nearly all instances. This is because damages are not measured by comparing a class member's loan prices to those of other class members in the actual world, but rather by comparing the class member's loan prices to the prices they would pay in the but-for world. Thus, even if a class member consistently did better than other class members in the actual world, our damages methodology still calculates damages for this class member.

76. By way of example, Dr. Hendershott identified three agent lenders as receiving better-than-average lending prices on their stock loans in Level 1 of the OTC market: [redacted] **Exhibit II.11** below presents the damages incurred by

[30] Hendershott Report ¶ 334.

these entities from their inability to transact their stock loans in the but-for world of platform trading. The analysis of damages has been limited to Warm and Hot stocks because our model does not identify any damages with the lending of GC shares.[31] All three agent lenders incurred damages on their Warm and Hot stock loans because, despite having received better prices, on average, than other lenders in the actual world, our damages methodology calculates even better prices in the but-for world.

EXHIBIT II.11
DAMAGES ON SELECT AGENT LENDERS ANALYZED BY DR. HENDERSHOTT



Notes: Updated Prime Broker Transactions Datasets. Damages at Level 1 do not include GC stocks. Damages are calculated using F_s of [redacted] for Lender Accounts (see Section III.E).

77. In another set of exhibits, Dr. Hendershott provides six charts that show the dispersion in lending prices for [redacted] and [redacted] stock loans (Exhibits 1A-C) and borrowing prices for [redacted] and [redacted] (Exhibits 2A-C) stock loans. He claims the dispersion is attributable to the identities of the counterparties.[32] Dr. Hendershott fails to provide any empirical evidence that the variation in pricing is the result of any specific counterparty attributes. **Exhibit II.12** shows that our damages methodology calculates damages for all of the class member accounts that traded the securities referenced in Dr. Hendershott's exhibits. As a result, price variation does not negate damages.

[31] Dr. Hendershott claims that the damages model in our Opening Report understated the costs associated with trading on an electronic platform (Hendershott Report, Section IV.C). As we discuss in Section III.E. of this report, we disagree with Dr. Hendershott's claim that our Opening Report disregarded certain costs of platform trading and consider Dr. Hendershott's estimates of these costs to be significantly overstated. Nonetheless, to demonstrate the robustness of our conclusions regarding damages, we present alternative estimates of damages that conservatively allow for additional costs associated with trading on an electronic platform. These conservative cost scenarios are discussed in Section III.E of this report.

[32] Hendershott Report ¶51, ¶73.

EXHIBIT II.12
HENDERSHOTT EXHIBITS 1 AND 2
SUMMARY OF COUNTERPARTIES AND DAMAGES

[redacted]

Notes: Updated Prime Broker Transactions Datasets. Number of distinct class member accounts are shown across all 6 Prime Broker Defendants. Damages are calculated using F_s of [redacted] for Lender Accounts and [redacted] for Short Seller Accounts (see Section III.E).

78. Dr. McCrary asserts in Exhibit 6 of his report that [redacted] These percentages are incorrect because Dr. McCrary's processing of the data was incorrect, as we explain in Section IV.A of this report. In **Exhibit II.13** below, we revise Dr. McCrary's analysis to reflect the corrections we made to his transactions dataset for all six Prime Broker Defendants.

EXHIBIT II.13
DAMAGES FOR ENTITIES RECEIVING "FAVORABLE" OR "UNFAVORABLE" PRICES
UPDATED TRANSACTIONS DATA AND DAMAGES

[redacted]

Notes: Updated Prime Broker Transactions Datasets. Share of Accounts receiving Favorable or Unfavorable prices are determined using the methodology from McCrary Report Exhibit 6 applied to data comprised of class member accounts. Shares differ from the McCrary Report because of corrections made to the data (See Appendix C). Damages for counterparties that received better or worse prices than the median for more than 75% of loan-days are calculated using F_s of [redacted] for Lender Accounts and [redacted] for Short Seller Accounts (see Section III.E).

79. Once corrected, Dr. McCrary's transactions dataset [redacted] However, our damages methodology calculates that [redacted] On the borrower side (Level 2), our revisions to Dr. McCrary's transactions data significantly alter Dr. McCrary's conclusions regarding "favorable" prices. Only [redacted]

[redacted] as he claims in Exhibit 6 of his report. Moreover, our damages methodology calculates [redacted]

80. Finally, we turn to Exhibit 3.A-C in Dr. Hendershott's report, in which he claimed to identify certain anonymized borrower (or short-seller) accounts that received better-than-average pricing from [redacted] **Exhibit II.14** below presents the damages incurred by these borrower accounts calculated under our damages methodology. Since Dr. Hendershott does not use the same set of client IDs in his Exhibit 3.A (all stocks), 3.B (GC stocks) and 3.C (HTB stocks), we include the results of each client ID utilized regardless of whether Dr. Hendershott includes the ID in Exhibit 3.A, 3.B or 3.C.

81. As set forth in Exhibit II.14, our damages methodology calculates damages for each of the client IDs that Dr. Hendershott analyzes in his Exhibits 3.A – 3.C.

EXHIBIT II.14
DAMAGES FOR IDS LISTED ON HENDERSHOTT EXHIBIT 3.A-C

[redacted]

Notes: Updated Prime Broker Transactions Datasets and Updated Pooled Prime Broker Dataset. Damages are calculated using F_s of [redacted] for Short Seller Accounts (see Section III.E). Highlighted cells are counterparties that appear in Hendershott Exhibits 3B or 3C but not 3A. [redacted] *See*, Section IV.A.1 and Appendix C.

82. Furthermore, even if a class member truly received esoteric pricing benefits due to their relationship with a Defendant, the class member could still receive that benefit in the but-

for world by staying OTC. For example, if a class member received 10% off their stock loan trades for a year because of unrelated IPO business, that class member can opt to trade OTC if they wish. Given our analysis, we have concluded that such situations are *de minimis*, but as we explained in our Opening Report and explain below, OTC trading would remain available to class members in the but-for world. Accordingly, if a class member with a truly special and preferential situation would be better off transacting in an OTC regime, they may do so while still enjoying the price discipline that the option of platform trading gave them. A world of choice is always better.

83. In summary, our impact methodology shows that even entities that received better-than-average prices in the actual world were damaged by the conspiracy. Our damages methodology, furthermore, calculates damages for virtually all lenders and borrowers identified by Defendants' Experts as having received "favorable" prices in OTC trading, either at Level 1 as lenders or at Level 2 as borrowers. The dispersion in stock loan prices observed in the actual world does not, when properly analyzed and evaluated, undermine our impact opinions or result in undamaged class members under our damages methodology.

B. Defendants' Experts Fail to Provide Economic Evidence of the Service and Benefits Purportedly Provided by Prime Broker Defendants to Short Seller Clients and Lenders

84. Defendants' Experts claim that the loan prices paid by the borrowing clients of the Prime Broker Defendants during the Class Period covered not only the stock loan itself but a variety of economic services provided by Prime Broker Defendants to their clients. Defendants' Experts claim that these "bundled services" included protection from recalls of stock loans by lenders ("recall protection"), protection from rerates of existing stock loans as market loan prices increased ("rerate protection"), preferential access to HTB stocks for certain clients, and other economic services unrelated to stock lending.[33] Defendants' Experts also contend that certain lenders "[redacted]", i.e., that [redacted]

[33] McCrary Report ¶ 58-72; Hendershott Report ¶ 60-68.

[redacted][34]

85. Defendants' Experts have relied almost entirely on citations to selected documents to support their claims. Despite the availability of detailed transactions data from the Prime Broker Defendants, Defendants' Experts provide no reliable economic evidence that the bundled services supposedly provided to borrowing clients, or the quid pro quo of GC utilization provided to certain lenders, occurred in any meaningful degree during the Data Period. They altogether fail to support their contention that the value of such services would have to be considered when comparing loan prices in the actual world to those that would have prevailed in the but-for world.

1. Recall Protection

86. As we noted in our Opening Report, most stock loans in the actual world are "on-demand" or "open" loans, with lenders holding the right to terminate the loan at any time.[35] Occasionally, lenders exercise this right and recall their shares. If the short sellers borrowing these shares wish to maintain their short positions, they have to replace these recalled shares with stock borrowed from another lender. If the short seller is unable to—or opts not to—replace the recalled shares, it will have to unwind its short position to return the recalled shares. Defendants' Experts assert that in the actual world, prime brokers provided protection to short sellers against recalls by lenders and that this service was "value-added."[36]

87. As we discuss below, Defendants' Experts fail to establish that any so called "recall protection" provided by the Prime Broker Defendants in the actual world would be better than how recalls would be processed in the but-for world. There are four reasons why Defendants' Experts vastly overstate the value of the "protection" purportedly provided by the Prime Brokers. First, recalls by lenders occur at roughly the same frequency in the OTC world and on the AQS platform. Second, the "recall protection" provided by Prime Broker Defendants to borrowers entailed searching from another lender, or supplying shares from their own internal holdings. This is similar, but not as effective, as the way a platform would find new shares in a but-for

[34] McCrary Report ¶ 93, Hendershott Report ¶¶ 97, 140.
[35] Opening Report ¶ 58.
[36] McCrary Report ¶ 62.

world. Third, the administrative functions which involve switching a borrower from one lender of securities to another are relatively straightforward and could be handled on a platform in a similar and potentially superior way than that employed by the prime brokers. Fourth, the few specific examples of recall protection provided by Defendants' Experts fail to establish that short sellers obtained any outcomes in the actual world they could not also have achieved in the but-for world.

Recalls Occur on Stock Loans whether the Loan is OTC or on a Platform

88. **Exhibit II.15** below shows the [redacted] Following Dr. McCrary's methodology, we examine the number of loan contracts that experienced a recall by lenders, as defined by the activation of a "recall on file" flag for this loan on one or more dates during its lifetime. As reported by Dr. McCrary, [redacted] Although not shown in Dr. McCrary's table, [redacted]

EXHIBIT II.15
[redacted] RECALL EVENTS BY TEMPERATURE CATEGORY
2012-2017

[redacted]

Notes: Updated Prime Broker Transactions Datasets. McCrary Report's transactions data for [redacted] Recalled contracts in the McCrary Report are identified using recall indicators observed in the [redacted]

89. Although Dr. McCrary presents recall-related information only for loans through [redacted] **Exhibit II.16** below presents a [redacted]

[redacted]

90. As we discuss in detail in Section III.B, [redacted] This means that even in its nascent form, [redacted] Since a recall is precipitated by a lender wanting its shares back, the key economic aspect of "recall protection" is not the existence of a recall, which occurs in any market with an on-demand product. Rather, the issue is if and how recalled shares are replaced.

EXHIBIT II.16
[redacted] RECALL EVENTS BY TEMPERATURE CATEGORY
2012-2017

[redacted]

Notes: Updated Prime Broker Transactions Datasets. The data was supplemented to include the field [redacted] (*See*, Appendix C.)

Prime Broker Defendants' Recall Protection Would be on Similar or Better Terms in the But-For World

91. Defendants' Experts do not articulate precisely what they mean by the "recall protection" supposedly provided by the Prime Broker Defendants. Dr. McCrary states that "[redacted]" and that "[redacted]

[redacted]"[37] Dr. Hendershott states "[redacted] In addition to [redacted] to the extent possible."[38]

92. If "recall protection" means that Prime Broker Defendants provide the channel through which short sellers obtain replacement shares, then the need for protection arises because borrowers have no other means to obtain replacement shares in the actual world. The reason for there being no other alternatives is that Prime Broker Defendants' OTC desks control the venues for stock lending and borrowing, an outcome that resulted from the conspiracy.

93. By contrast, in the but-for world with one or more stock loan platforms, a supply of replacement shares would be centrally located and available on these platforms. This includes supply from multiple prime brokers. Therefore, if a lender recalled shares, a short seller could simply access the platform and switch to the next available source of supply. Recall protection by a particular Prime Broker would be unnecessary because the short seller would have immediate access to multiple suppliers of shares, and not be constrained to those of a particular Prime Broker. In our opinion, such substitution will be more readily facilitated when all market participants are able to view available stock loan supply at available prices on an exchange. In the supply-and-demand framework of our Opening Report, we emphasized that the equilibrium quantity of shares lent is greater in the but-for world when the prime broker does not stand between the lender and borrower.

94. If the supply used by Prime Broker Defendants to provide replacement shares to borrowing clients is drawn from the Prime Broker Defendant's internal sources—for example, the rehypothecation of shares purchased by their clients on margin financed by the Prime Broker Defendant—Drs. McCrary and Hendershott do not explain why this internal supply cannot be directly available on a platform. If a stock faces recall, there would be strong incentives by agent lenders or beneficial owners to lend shares to short sellers on the platform because they could

[37] McCrary Report ¶ 65.
[38] Hendershott Report ¶ 99.

command a higher price. This is why, in economics, the supply curves are upward sloping: a higher price induces more supply.

The Administrative Aspects of Recall Protection Could Easily Be Implemented in the But-For World

95. A second aspect of "recall protection" purportedly offered by Prime Broker Defendants is the administrative aspect of finding the shares for the borrower. [redacted] However, Defendants' Experts fail to recognize that a platform can do exactly the same thing. [redacted][39]

96. Moreover, to the extent borrowers place any value on not having to monitor and manage their borrowing positions against lender recalls, the but-for world would provide a variety of solutions for avoiding these administrative burdens. For example, electronic platforms could transact stock loans with stipulated terms to maturity, which would eliminate the need for borrowers to track recalls over the term of the loan. The additional loan price a borrower would have to pay to induce lenders to extend a term loan rather than an "open" loan would also provide a transparent, market-based measure of the price a borrower has to pay to avoid the uncertainties and administrative aspects of managing recalls.

97. Alternatively, platforms in the but-for world could feature trading mechanisms that would shield borrowers from managing recalls. For example, the Indian Stock Lending Exchange has developed a protocol in which lenders initiating recalls send a borrow request to the Exchange, which effectively cancels out their stock loan without requiring borrowers to have to return shares.[40] Likewise, [redacted]

[39] *See* [redacted] at '608 (internal [redacted] memo stating "[redacted]").

[40] *See* India National Stock Exchange, Securities Lending & Borrowing Mechanism (SLBM) Brochure at 5, *available at* https://www1.nseindia.com/invest/content/SLB_brochure.pdf (explaining the exchange features a "Recall and Repay Facility" that automatically implements a Lender Recall as a new countervailing "regular borrow transaction" and a Borrower Return (Repay) as a new countervailing "regular lend transaction"). Defendants' Experts inexplicably fail to consider the dynamics of securities lending markets outside of the United States in forming their opinions. *See* Pridmore Tr. at 220:17-232:19, 285:19-287:24.

[41] [42] [43]

Defendants' Experts Fail to Provide Empirical Evidence of "Value-Added" Recall Protection

98. Defendants' Experts claim that the Prime Broker Defendants "[44] They support this claim by citing

99. If these claims were indeed commonly true about the Prime Broker Defendants, and applied during the Class Period, Defendants' Experts would have had no difficulty documenting the ubiquity of such "recall protection" in the stock loan transactions data provided by the Prime Broker Defendants. Instead, across the thousands of stocks lent over a six-year period, Dr. Hendershott offers no empirical evidence of such "recall protection" being provided. Dr. McCrary identifies only two episodes, [45] Those examples are cherry-picked from the millions of CUSIP-Days of stock loans covered by the Prime Broker Defendants' transactions datasets. Dr. McCrary makes no attempt to explain what, if any, systematic method was used to select those two examples from all the transactions in evidence. In fact, it should be noted that

[41]
[42] Decl. ¶ 14; *see also id.* 15 ( ).
[43] *Id.* ¶ 14.
[44] McCrary Report ¶ 66; Hendershott Report ¶64.
[45] McCrary Report ¶ 68-70.

100. Empirical support as highly selective as Dr. McCrary's would, by itself, render Drs. McCrary's and Hendershott's claims about "recall protection" unreliable. But their claims are further called into question by other evidence surrounding these selective examples. Our analysis indicates that, to the extent that the Prime Broker Defendants (such as [redacted]) in fact offered any recall protection, [redacted] Whatever recall protection the Prime Broker Defendants provided is economically similar to what would happen on a platform, where borrowers may pay higher rates to attract new supply to replace recalled shares.

101. We begin by examining stock loans for [redacted] in [redacted][46] Dr. McCrary points to a period from [redacted]

102. [redacted]

103. Dr. McCrary's take-away from the [redacted] example is that [redacted]

[46] *See* Appendix Exhibit D.1.

However, he provides no explanation for why borrowers in this example would not have secured the same, or economically better, outcomes in the but-for world. Public markets with transparent loan prices elicit additional supply by raising prices. Drawing forth replacement shares through the incentive of higher loan prices is precisely how we would expect a public stock loan market to address borrowers' desire to maintain (or increase) their borrow positions. Dr. McCrary provides no basis to conclude that efficient stock lending platforms would not elicit the additional supply of shares that emerged in the actual world, allowing short sellers to replace the recalled shares and maintain their short positions. Indeed, to the extent that stock loan prices would have been more favorable in the but-for world, short sellers would have maintained their short positions on better terms than they did in the actual world. Therefore, borrow clients in this [redacted] episode received no additional "protection" of their short positions beyond what they would have received on a stock loan platform at better terms.

104. The [redacted] episode cited by Dr. McCrary fails to establish any economically valuable recall protection. It also reveals that the [redacted] provided no "rerate protection" to borrowers. As lenders recalled their shares, [redacted]

105. In this example, the data does not indicate where [redacted] found the additional shares to allow its borrowing clients to maintain and even increase their borrowings. However, one possible explanation is that [redacted] sourced the additional shares internally to replace the shares recalled by lenders. If this internal supply of [redacted] came from the rehypothecation of client shares purchased on margins funded by [redacted] these shares would not have entailed any additional cost for [redacted] to source, so that the additional revenues from lending these shares to borrow clients would have represented a profit for [redacted] As noted by [redacted] "[redacted]

[redacted]"[47] Thus, if the recall "protection" provided by [redacted] came through additional internal supply, this "protection," far from being costly for [redacted] to provide, might have even been profitable for [redacted]

106. [redacted] There is no reason to conclude that borrowers could not have received similar "protection"—i.e.,

[47] "[redacted]" [redacted] at '926. [redacted] explained that a [redacted] and [redacted] Id.; see also, "[redacted]" [redacted] at '228 ("[redacted]") In another document, [redacted] November 2011, [redacted] at '683. [redacted] also describes the [redacted] Id. A [redacted] presentation indicates that [redacted] "[redacted]" March 2007, [redacted] p. 10; see also "[redacted]" May 26, 2010, [redacted] at '436 ("[redacted]").

maintaining or raising their borrow positions at the expense of higher loan prices—on a stock loan platform.

107. The second example of "recall protection" cited by Dr. McCrary, involves [redacted] stock.[48] Dr. McCrary notes that on [redacted] lenders of [redacted] shares [redacted] "[redacted]"[49] Dr. McCrary states that "[redacted]"[50]

108. Dr. McCrary's inference that [redacted] provided "protection" by increasing its borrowing of [redacted] shares appears to be based on the fact that although the recall [redacted] the total amount lent to [redacted] If true, this merely illustrates a mechanism by which electronic platforms would also allow borrowers to replace any recalled shares—incentivizing supply of new shares by additional lenders. The loan price charged by [redacted] However, there is no basis to conclude that [redacted] was a form of price protection from [redacted] around the recall, because the loan price for borrowing shares had been [redacted] That is, loan prices could simply reflect prevailing market conditions for [redacted] stock.

109. In summary, the two examples cited by Dr. McCrary as empirical evidence of recall "protection" provided by Prime Broker Defendants fail to support the existence of such "protection." As noted above, the stock loans for [redacted] raising further questions about the reliability of any conclusions Dr. McCrary draws from transactions in [redacted] stock loans.

[48] *See*, Appendix Exhibit D.2.
[49] McCrary Report ¶ 68.
[50] McCrary Report ¶ 68.

110. As we have discussed with the [redacted] and [redacted] recall examples, stock lending platforms are also perfectly capable of providing borrowers "protection" against lender recalls by incentivizing other suppliers, including lenders and prime brokers with internal supply, to make additional shares available to lend. If enough replacement supply is not available at the currently prevailing loan price, a platform will induce this additional supply by raising the price of stock loans until additional supply matches demand. Nor, as discussed below, do Defendants' Experts provide any evidence that prime brokers do not pass on rate changes associated the recalled stock loans that have become more expensive. Defendants' Experts have, indeed, failed to establish that the Prime Broker Defendants provided any "rerate protection" to their borrower clients.

2. Rerate Protection

111. Dr. Hendershott claims that another economic service the Prime Broker Defendants provided their borrowing clients was protection against price fluctuations, or rerates, in the stock lending market. Dr. Hendershott notes that "[redacted]"[51] He cites [redacted] of [redacted] stating that "[redacted]" including "[redacted]"[52]

112. Dr. Hendershott is elusive in defining what he means by rerate protection. Although he speaks of "smoothing" of loan rates by Prime Broker Defendants, he does not explain or offer any evidence that smoothing is beneficial. In fact, smoothing may harm end-users by limiting their access to price moves in their favor. The Prime Broker Defendants' incentives are to (i) pass along rerates that squeeze their spreads while (ii) maintaining any increase in their spreads that result from rerates.

113. By citing [redacted] remarks above, however, Dr. Hendershott appears to be suggesting that rerate protection (or mitigation) protects clients only from unfavorable changes in loan prices. Dr. Hendershott does not, however, provide any empirical proof that prime brokers "smoothed" rerates, let alone that they only did so when the price move was unfavorable to their

[51] Hendershott Report ¶ 87.
[52] Hendershott Report ¶ 87.

clients. Nor does Dr. Hendershott cite any documents produced by the Defendants, any deposition testimony, or any economic papers published about the prevalence of re-rate protection in the market.

114. Our analysis of Dr. McCrary's [redacted] and [redacted] episodes discussed above demonstrate how borrowers were not protected from rerates caused by fluctuating market demand. The only evidence Dr. Hendershott provides to support his contention that Prime Broker Defendants provided rerate "protection" [redacted][53] [redacted][54] [redacted][55]

115. Dr. Hendershott, however, fails to note what is evident from his own Exhibits 6.A. and 6.B.—that as loan prices [redacted] Taking the relative sizes of transactions at different prices in the lending and borrowing segments of the stock loan market (i.e., Level 1 and Level 2), the composite, or weighted average, loan cost paid by [redacted] for its borrowings at Level 1 was [redacted]

[53] Hendershott Report ¶ 88.
[54] Hendershott Report ¶ 88.
[55] Hendershott Report ¶ 88.

116. **Chart II.1** below shows that this was indeed the case. We use the data provided by Dr. Hendershott in his Exhibit 6 to construct the weighted average loan costs paid by [redacted] to lenders and charged by [redacted] to its borrowing clients.

CHART II.1
WEIGHTED AVERAGE PRICES AT LEVEL 1 AND LEVEL 2
[redacted] STOCK LOAN (HENDERSHOTT EXHIBIT 6.A AND 6.B)

[redacted]

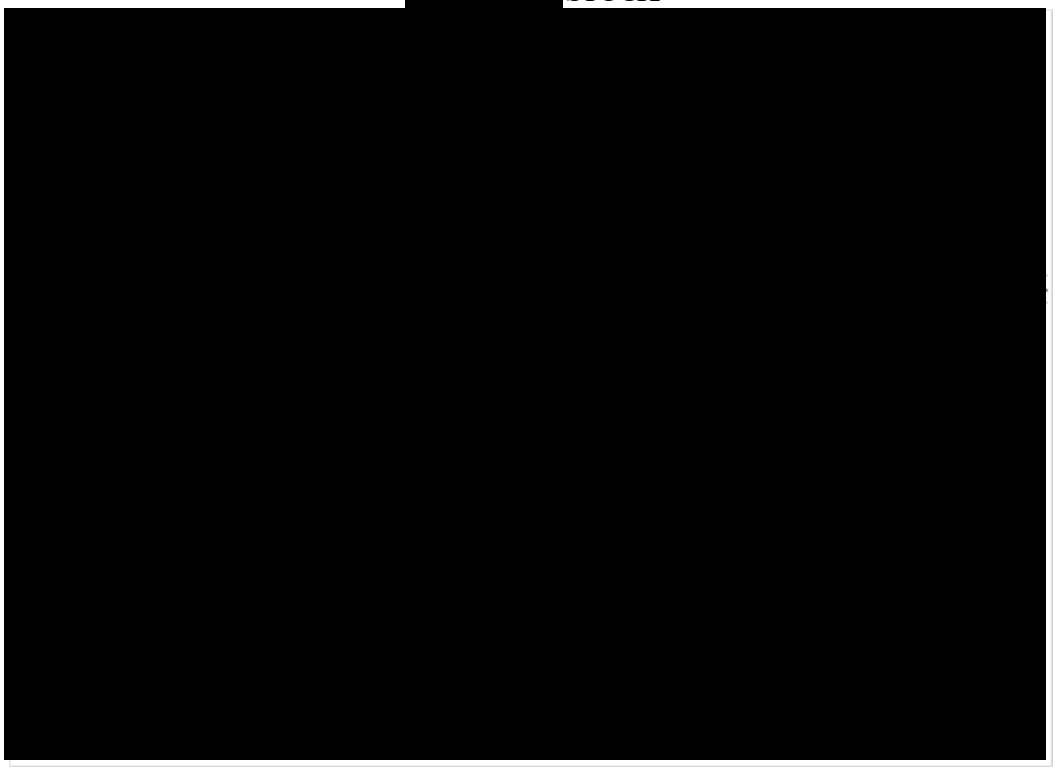
Note: Updated Prime Broker Transactions Datasets.

117. The Chart shows that there is [redacted] Our analysis shows that in the beginning of Q3 2017, the weighted average price charged by [redacted] in the shorting market across all its loans was about [redacted] If [redacted] had provided rerate protection services to its customers, we would [redacted] Instead, we observe that as of [redacted] In other words, [redacted]

[redacted] evidently did not provide rerate protection against the rising loan costs of [redacted] in Q3 2017.

118. **Chart II.2** provides further insight into the [redacted] on [redacted]—and the absence of meaningful rerate protection on this stock—through the third quarter of 2017. This chart shows the spread between the Level 1 and Level 2 weighted average loan price earned by [redacted] on [redacted] stock each date in [redacted] The Chart establishes that before [redacted]

CHART II.2
WEIGHTED AVERAGE PRICE AND SPREAD BETWEEN LEVEL 1 AND LEVEL 2
[redacted] STOCK



Note: Updated Prime Broker Transactions Datasets.

119. Dr. Hendershott has failed to provide any evidence that Prime Broker Defendants provide meaningful rerate "protection" to their borrowing clients. Dr. McCrary, for his part, [redacted][56]

3. [redacted]

120. [redacted][57]

[56] McCrary Tr. 169:14-17.
[57] Hendershott Report ¶ 83.

[58] stock borrows and stock loans are "fundamentally different products with different economic characteristics and different pricing considerations."[59] He also asserts that [60] We disagree.

The Prime Broker Defendants Do Not Borrow What They Cannot Lend.

121. [61]

122. Dr. Hendershott is wrong. His view is informed by a mistaken reliance on vague deposition testimony by a Defendant witness, improper interpretation of a document, and flawed empirical analysis of the Prime Broker Defendant data.

123. First, he cites to the deposition testimony of who explained that "[redacted]" But Dr. Hendershott offers no empirical proof of this statement using the data made available to him, nor does he attempt to analyze or explain what is meant by "[redacted]"

124. While it is possible that over a long horizon with millions of CUSIP-Day stock loan transactions one will observe imbalances in shares borrowed or loaned on a CUSIP-Day, the evidence shows that the Prime Broker Defendants did not borrow what they could not lend. Moreover, Dr. Hendershott misinterprets the document that he relies upon for his opinion that an

[58] Hendershott Report ¶¶ 86-87.
[59] Hendershott Report ¶ 81.
[60] Hendershott Report ¶ 62.
[61] Hendershott Report ¶ 84.

imbalance exists in the quantities borrowed and lent by prime brokers. Dr. Hendershott makes reference to an [redacted] report and focuses on the page that [redacted] He notes that this document shows that in [redacted][62] [redacted][63] On this topic, the [redacted] explains in one document, "[redacted]"[64]

125. As we noted in our Opening Report, even after a locate request is submitted by a short seller, a prime broker does not guarantee that it can be fulfilled. If a prime broker decides that locating a share is too difficult or too risky, it can always opt not to fulfill the request. It follows that there is little pricing risk to the prime broker since it typically quotes a loan fee only after the security is located and the pricing terms of its supply are certain.[65]

126. Third, Dr. Hendershott's opinion that loans and borrows are often mismatched [redacted]

[62] Hendershott Report ¶ 83 & n.153. *See also*, "[redacted]" December 2009, pp.3, 4, 7, [redacted]

[63] *See,* "[redacted]" December 2009, p.3, [redacted]

[64] *See* "[redacted]", undated, [redacted]

[65] In our Opening Report, we also explain that "[l]ocating shares in the stock loan market, however, involves relatively little inventory risk, since loans are typically not initiated at Level 1 until after a locate request is made by the short seller at Level 2. Broker-dealers basically pass through the security from the beneficial owners to short sellers. *See,* Opening Report ¶¶ 97-100. We also explain that "[e]ven after a locate request is submitted, a broker-dealer does not guarantee that it can be fulfilled. If the broker-dealer decides that locating the share is too difficult or too risky, it can always opt not to fulfill the request. Thus, there is little inventory risk to the broker-dealer in stock lending." […] "There is also little pricing risk to the broker-dealer, since broker-dealers typically quote a loan fee only after they have located the security and know the terms of their supply. As a result, there is little price risk to the broker-dealer." *See* Opening Report ¶¶ 105-106.

[redacted] For example, a [redacted] report titled, "[redacted]" tracked the [redacted] In **Exhibit II.17** below, we summarize the report's breakdown of borrows and loans for calendar years 2009 through 2012.[66] [redacted]

EXHIBIT II.17
[redacted] US STOCK LOAN DOMESTIC EQUITY DESK
P&L SUMMARY 2009 – 2012

[redacted]

Notes: [redacted]

127. Fourth, Dr. Hendershott fails to acknowledge that the [redacted] provided by the prime brokers does not create an economic outcome that an anonymous stock loan platform could not create itself. Indeed, platforms would create a centralized source of supply in contrast to the currently fragmented supply among the Prime Broker Defendants. In the but-for world, supply would be available on platforms, which would reduce search costs when sourcing replacement shares. As a result, market participants would no longer be dependent on the prime brokers to source stock loans.

4. [redacted]

128. The Defendants' Experts claim that the Prime Broker Defendants [redacted] They argue that

[66] *See* [redacted]

[redacted] Dr. Hendershott analyzes data on locate requests and their approvals by the Prime Broker Defendants and opines that his analysis is "[redacted]"[67] Dr. McCrary opines that "[w]hen stock is HTB, [redacted]"[68] The Defendants' Experts criticize our damages methodology, claiming that platform trading would have [redacted][69]

129. Defendants' Experts' analyses are flawed and inconclusive for two reasons. First, the data on locates are not a reliable indicator of loan activity. This is because an approved or fulfilled locate need not imply a completed loan transaction. Moreover, idiosyncrasies with the locate data undermine the reliability of Defendants' Experts use of them, particularly related to the fraction of shares fulfilled in a locate approval. Second, and more importantly, we conclude based on application of our damages methodology that all or nearly all clients who have locates fulfilled would have received a more favorable price in the but-for world compared to the locate price.

130. As a regulatory requirement, a stock must be located before completing a short sale. However, this is not always the case in practice. Indeed, an SEC administrative proceeding against the [redacted][70] On the other hand, when a stock is located, it does not necessarily correspond to completed loan transaction. That is, if a locate request is approved, a short seller may opt to transact elsewhere, or not complete the transaction at all. Locate requests can also be submitted by short sellers simply to gather information about prevailing market prices. Indeed, Dr. Hendershott's report states that locate requests are a "mechanism to gather information on share availability."[71] Because of the

[67] Hendershott Report ¶ 77.
[68] McCrary Report ¶ 58.
[69] Hendershott Report ¶ 343.
[70] *See,* U.S. Securities and Exchange Commissions, Release No. 76899, File No. 3-17053, January 14, 2016.
[71] Hendershott Report ¶ 110.

anonymization of the locate datasets, it is not possible to link the locate requests by a particular client to their stock borrowing activity.

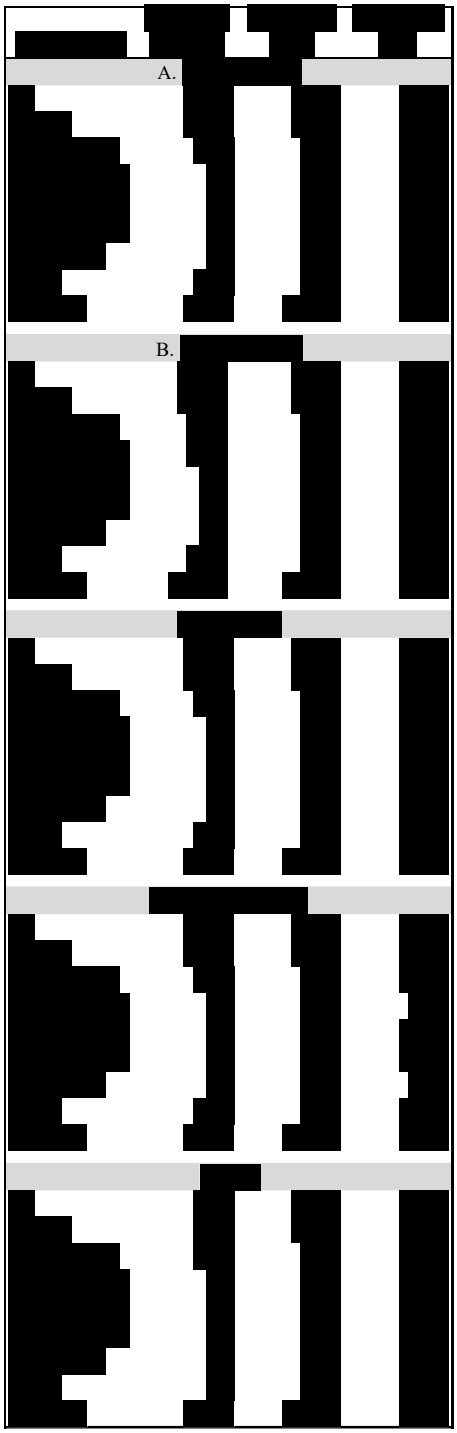
131. Next, we note that there are at least two measures of locate activity. The locate approval rate measures the percentage of stock locates where any portion of a locate is approved by a Prime Broker Defendant receiving the request. A fulfillment rate measures the percentage of stocks requested in a locate request that is approved by the Prime Broker Defendants. If a loan is not approved, it is by definition not fulfilled. Whether a stock locate was approved or fulfilled does not mean the short seller actually borrowed these shares.

132. When addressing Dr. Hendershott's analysis, we first note that the data he relies upon contains idiosyncrasies that raise questions about its reliability as shown below in **Exhibit II.18**. For example, [redacted] Since GC securities are in abundant supply, the locate fulfillment rate should be universally high.

133. Moreover, in the data used by Dr. Hendershott, [redacted] Yet, we find, as set forth in Exhibit II.18, that for [redacted]

134. Furthermore, the volumes observed in the locate datasets are surprising. [redacted]

EXHIBIT II.18
SUMMARY OF QUANTITIES OF SHARES FULFILLED
BY TEMPERATURE CATEGORY USED IN MCCRARY REPORT



Notes: Prime Broker Locate Dataset. Quantity of shares in billions. Fulfillment rate is the sum of all shares approved divided by the sum of all shares requested. "NULL" reflects locate requests where temperature could not be determined.

135. These idiosyncrasies may be the consequence of the fact, mentioned above, that a fulfilled locate request may not result in a loan. That is, the number and attributes of loans that are transacted is not necessarily related to number of attributes of locates requests approved.

136. Notwithstanding these peculiarities, we analyze the locate data provided by the Prime Broker Defendants to evaluate the claims of Defendants' Experts that [redacted] We focus our attention on the locate approvals, defined as whether any portion of a locate is approved.

137. Dr. Hendershott claims the analysis in his Exhibit 4 demonstrates that prime brokers have certain [redacted] who "[redacted]"[72] But, even if we disregard the idiosyncrasies of the locate data, Dr. Hendershott's analysis merely demonstrates that [redacted] In other words, this is a speculative assertion that Dr. Hendershott does not prove with the support of the data available to him.

138. Dr. McCrary presents an analysis that closely tracks Dr. Hendershott's on the issue of locate approval. Dr. McCrary's analysis in his Exhibit 4 [redacted] Dr. McCrary claims his analysis demonstrates [redacted][73] Applying a statistical *F*-test to his analysis, Dr. McCrary claims "the likelihood of observed differences across clients occurring by chance rather than systematically is less than one in a trillion."[74]

139. While Dr. McCrary's *F*-test shows the existence of differences across clients in locate rates, it does not say anything about the magnitude of these differences. In **Exhibit II.19**, we divide the counterparties into groups based on their locate approval percentages. Counterparties

[72] Hendershott Report, ¶ 342.
[73] McCrary Report, ¶ 84 and Exhibit 4.
[74] McCrary Report, ¶ 85.

with a locate approval of 100% have their own category while those with less than 100% were divided into deciles. We performed our analysis on each Prime Broker Defendant separately because [redacted][75]

EXHIBIT II.19
SHORT SELLERS LOCATE APPROVALS AND COMPARISON TO PLATFORM PRICE

[redacted]

Notes: Prime Broker Locate Dataset. Counterparties are divided into deciles based on their Average Locate Approval rate. Percent of locate requests for which platform price + F_P +F_S< locate request price excludes locates where the quantity approved is zero. For this analysis we applied an F_S of [redacted]

140. The analysis set forth in Exhibit II.19 [redacted]

[75] We exclude from the above analysis the Locate Data produced by [redacted] We exclude [redacted] *See* McCrary Report, Appendix C.7.2.

[redacted]

141. Next, to examine whether high-locate clients are better off in the but-for world, we compare the but-for world platform price to the locate price. [redacted] In other words, even a short seller with high locate approval rates would prefer platform prices to dealer-intermediated prices, so preferential access in the actual OTC world does not mean that the short seller is not harmed on the vast majority of transactions.

142. In summary, Defendants' Experts have failed to establish [redacted] and therefore indicating that they were damaged on the stock loans they conducted.

5. GC Utilization

143. Dr. Hendershott provides opinions about how agent lenders at Level 1 allocate their beneficial owners' stock. [redacted][76] he also claims that some agent lenders "[redacted]"[77] Dr. McCrary similarly claims that "lenders may also benefit from relationships with prime brokers by achieving higher GC utilization"[78] and translates his opinion into one about our damages methodology, concluding that our damages should "account for the difference between the lender's actual utilization and its but-for utilization [of GC collateral]."[79]

[76] Hendershott Report ¶ 38 (quoting "[redacted]" September 26, 2012, [redacted] at '882).
[77] Hendershott Report ¶ 38. [redacted] Tr. at 138:14–151:21.
[78] McCrary Report ¶ 93.
[79] McCrary Report ¶ 94.

144. We disagree with these opinions. To begin, we note the Defendants' Experts provide no operational definition of ratio lending. Ratio lending is a vague notion that agent lenders will allow prime brokers better access to HTB stock if they borrow higher amounts of GC stock. Despite having transaction data available to test this purported link, Defendants' Experts fail to provide any meaningful empirical analysis demonstrating this relationship and its impact on our damages methodology. Rather, Drs. Hendershott and McCrary rely upon isolated documents from discovery, anecdotes, and a single Exhibit 11 which provides no definitive test of the Defendant's ratio lending arguments. Defendants' arguments about ratio utilization are irrelevant and necessitated by the Defendants' Experts' assertion that price dispersion is due to unique product attributes and customer identity instead of pricing opacity and monopoly power. Below we discuss how [redacted] More importantly, we do not claim damages on Level 1 GC collateralized stock lending transactions which are not part of the class.

145. Dr. Hendershott's Exhibit 11 [redacted] But his analysis demonstrates nothing of the sort.

146. Dr. Hendershott's Exhibit 11 emphasizes f[redacted] Dr. Hendershott does not address why [redacted] More fundamentally, [redacted] Dr. Hendershott has not stated what this relationship must be. That is, is ratio lending defined as an agent lender lending the same share of GC and HTB to a prime broker (i.e., a one-for-one ratio) or would an agent lender who lends twice the amount of GC relative to HTB to a prime broker (i.e., a two-for-one ratio) count? Without such a definition, comparisons of the amount of GC lending to HTB lending are meaningless. Facts about the ratio of GC to HTB does not establish the presence of ratio lending.

147. This ambiguity can be illustrated in Exhibit 11 directly. Dr. Hendershott draws our attention to the data point reflecting [redacted]

[redacted] But he makes no mention of [redacted] Do these points all indicate ratio lending, or are they the coincidental ratios that can be extracted from the data?

148. Similarly, there are other ratios in the Exhibit: [redacted] As a matter of fact, for any pair of agent lender and prime broker, there would be a ratio between GC and HTB. Choosing a few ratios which have a positive correlation between GC and HTB does not provide support for ratio lending. For example, if there is a fixed cost to establishing an agent lender-prime broker relationship, e.g., due to technology or other operational reasons, we would also expect that a positive relationship between GC and HTB, which has nothing to do with ratio lending.

149. Second, as explained above, [redacted][80] As Dr. Pathak testified at his deposition, because there is an abundance of GC collateral supply, it does not matter who is lending it.[81] Ample replacement sources of GC collateral are available if such securities are recalled by lenders in either the OTC or platform market structures.

150. Third, as demonstrated in **Exhibit II.20** below, over the Data Period, [redacted] In the wake of the 2008 financial crisis, many agent lenders undertook a shift in their business model and were no longer interested in linking GC and HTB securities to maximize GC utilization rates. A report by Finadium in 2011 based on a survey of agent lenders states: "The perception in the agent lender community is that the GC for specials trade is effectively dead, a victim of the financial crises. Given Basel 2.5 and III requirements, it is no longer practical or feasible for a bank to support these trades. Specials are now lent at the full

[80] [redacted] Declaration ¶ 14; [redacted] Declaration ¶ 15.
[81] Pathak Tr. 322:9-323:24.

market rate of the security with no pricing preference given to the counterparty in exchange for other segments of the business…"[82] [redacted][83]

151. Exhibit II.20 showing stock loans in the Prime Broker Transactions Datasets bears this out. Over the Data Period, [redacted]

[82] "Borrowing Stock in 2011: Agent Lenders on Prime Brokers in Equity Securities Lending", Finandium, December 2011, p. 16.

[83] Following an SEC roundtable of industry participants, it was noted that increased risk concerns had "[redacted]" *See,* Internal email containing notes from [redacted] October 1, 2009, [redacted] noted that, "[redacted]" Charles Rizzo, CFO John Hancock Group of Funds, John Hancock Investments, observed that, "[i]n the second quarter, we pivoted to take a more conservative view of our lending programme because of the risk-return trade off. As a beneficial owner, we have historically liked the GC trade but as reinvestment yields decreased we utilized [sic] caps to our total lending programme to squeeze out GC loans. More recently we increased our minimum spreads…the effect is that we are basically out of GC today." Eric Pollackov, Managing Director ETFs, client portfolio strategist Charles Schwab & Co stated that, "[w]e impose a minimum floor of 100bps on stock loans to ensure that we do not have GC loans on our books." *See,* "US Beneficial owners roundtable," Global Investor Group, March 4, 2015**,** https://www.globalinvestorgroup.com/articles/3432952/us-beneficial-owners-roundtable**.**

EXHIBIT II.20
GC NOTIONAL VALUE AS A PERCENT OF TOTAL NOTIONAL VALUE
2012-2017

Notes: Updated Pooled Prime Broker Dataset.

152. This reduction in lending GC stock was driven, in part, from the low profits associated with GC lending. For example, a document from SCERA notes that, "[redacted]"[84] In 2015, Charles Rizzo, CFO of John Hancock Group of Funds remarked, "[w]e are basically out of GC today" […] "We felt that it did not make much sense to have a lot of GC that would be earning little income and exposing our lending funds to unrealised [sic] losses."[85]

153. Defendants' own documentary evidence [redacted] In a document cited by Defendants' Experts, [redacted] explained that ratio lending, "[redacted]" is "[redacted]

[84] *See* "Update on Securities Lending," *See,* [redacted].

[85] *See,* "US Beneficial owners roundtable," Global Investor Group, March 4, 2015, https://www.globalinvestorgroup.com/articles/3432952/us-beneficial-owners-roundtable.

[redacted][86] In another document cited by Defendants' Experts, [redacted] told [redacted] representatives during a lunch that "[redacted]"[87]

154. Exhibits II.7 and II.8 discussed in Section II.A.2 also show that [redacted] Both exhibits, [redacted] GC utilization rates do not explain whether a prime broker received more or less favorable pricing from the agent lender.

155. Dr. Hendershott observes that [redacted][88] We note that on a platform, nothing precludes a beneficial owner from hiring an agent lender to manage how their shares are lent. An agent who is better at lending shares, such as by setting smarter lending rates and offering differentiated lending services, would attract more clients.

156. Dr. Hendershott also argues that [redacted][89] He asserts that in the but-for world lender utilization rates would also change "because the non-price relationship based factors that influence GC lending opportunities in the actual world would be irrelevant on an anonymous platform like AQS."[90] As discussed above, our damages model indicates that the beneficial owners that receive marginally better prices than other beneficial owners in the OTC market would get an even better price on the platform than they get in the OTC market. That is, if a beneficial owner obtains a better price than other beneficial owners in

[86] *See* "[redacted]" September 26, 2012, [redacted] at 9886.
[87] *See* [redacted] email containing meeting notes, May 4, 2009, [redacted]
[88] Hendershott Report ¶ 47.
[89] Hendershott Report ¶ 139.
[90] Hendershott Report ¶ 339.

the OTC market, this does not mean that the beneficial owner is not damaged. In addition, since the but-for world is one of choice, a beneficial owner or agent lender could continue to conduct trading on a named-disclosed basis with the prime brokers, either on the AQS platform through the NTF or OTC.

157. Defendants' Experts assert that it is necessary to account for lost revenue on GC lending in our damages model.[91] It is important to emphasize that our model does not imply that GC lending ceases to exist in the but-for world. In fact, in our supply-and-demand framework, without the prime broker intermediary, the total amount of GC lending increases, and the price earned by GC net of fees is equal to the price currently earned by GC lenders in the OTC world. While we do not claim damages on Level 1 GC stock lending transactions given that these prices are the same our model implies continued and robust GC trading. Accordingly, our damages model does not fail to account for any significant element of cost associated with purported GC utilization arguments asserted by the Defendants. In fact, Level 1 loans of GC stock are not in the class and as noted above, our model does not seek damages on Level 1 GC stock loans in the first place.

158. Drs. McCrary and Hendershott are incorrect in their claims that stock lending and borrowing in the OTC market comes with certain bundled economic services. In the absence of meaningful bundled services, the supply-and-demand framework we utilized in our Opening Report remains valid in identifying how both borrowers and lenders could achieve more favorable prices for their stock loans in a but-for world with electronic platforms. Similarly, our damages methodology continues to provide a reliable means of calculating damages on a class-wide basis. Even if, however, there were bundled economic services in the OTC market, those services would still be provided in the OTC market in the but-for world, but at lower prices.

C. Defendants' Experts Fail to Establish that Market Information was Transparent Across the Two Levels of the Stock Lending Market.

159. In our Opening Report we explained that "Despite its importance and size, with trillions of dollars of securities borrowed and lent between the largest financial market participants each year, the stock lending market in the U.S. remains an opaque, OTC market."[92]

[91] McCrary Report ¶ 94.
[92] Opening Report ¶ 44.

We also explained that "while data providers did provide some transparency about loan costs, the level of transparency was limited" because "one could not effectively compare Level 1 and Level 2 loan costs, let alone do so simultaneously."[93]

160. Dr. Hendershott responds to this economic analysis by separately discussing the types of pricing information available on each side of the market (Level 1 separate from Level 2).[94] This misses the mark, as Dr. Hendershott's discussion does not respond to our central opinion on price transparency—that in the real world, only the Prime Broker Defendants have simultaneous, real-time visibility into Level 1 and Level 2 prices. Indeed, in our Opening Report, we acknowledged that there existed some same-side pricing information available for Level 1 or Level 2.[95] Thus Dr Hendershott's analysis is largely irrelevant to our conclusions—transparency *across* Level 1 and Level 2 remains missing, and all class members would be better off if such transparency were made available to the market.

161. Defendants' Experts also overstate the amount of same-side price transparency available in the real world. For example, Dr. Hendershott asserts that short sellers can "[redacted]" and they can use the submission of locate requests to prime brokers as a "[redacted]"[96] He also claims that Agent Lenders have "[redacted]"[97] Dr. McCrary similarly claims that "Plaintiffs' experts' suggestion that these large entities [hedge funds that are large and sophisticated institutions] were ill-informed or unable to negotiate good pricing is unsupported".[98] He also claims, referring to large agent lenders such as [redacted] and [redacted] that, "Plaintiffs' experts' unsupported assertion that these large and sophisticated entities were ill-informed and unable to negotiate good pricing is unsupported and not credible."[99]

[93] Opening Report ¶ 168.
[94] Hendershott Report ¶¶ 105-121.
[95] Opening Report ¶¶ 157-68.
[96] Hendershott Report ¶ 110.
[97] Hendershott Report ¶ 106.
[98] McCrary Report ¶ 111.
[99] McCrary Report ¶ 113

162. The real-world mechanisms identified by Defendants' Experts, however, are costly and inefficient. Assuming a short seller utilizes a prime broker or more than one prime broker to obtain this information, these serial, recurring inquiries incur direct costs and search frictions. The broader transparency that a platform would give these (and all) class members is highly valuable pricing information, especially if pricing information were available on a real-time basis.

163. The common economic evidence also confirms that the types of pricing information cited by Defendants' Experts are single-sided in nature, and that the Defendants actively suppressed any ability for class members to gain transparency into the broader market (across both levels). For example, one [redacted] document describes its "[redacted]" as of [redacted] Another passage describes how [redacted][100] [redacted][101] [redacted][102] [redacted][103] [redacted][104]

[100] *See,* "[redacted]" June 19, 2009, [redacted] at 9708-9711.
[101] *See,* [redacted] Tr. 277:15-278:7 ([redacted]").
[102] Ex. 517 ([redacted]); [redacted] Tr. 302:16-305:21.
[103] Ex. 2032 ([redacted]); [redacted] Tr. at 273:15-274:5.
[104] *See*, Ex. 2841 ([redacted] at '450); [redacted] Tr. 365:22-371:3); Ex. 519 ([redacted] at '277); [redacted] Tr. at 275:15-20; [redacted] Tr. 340:20-321:5; 341:22-342:18;

164. [redacted] For example, one [redacted] 2010 internal presentation on its stock lending business observed that "[redacted]" and noted that the "[redacted]" due to "[redacted]"[105] As another example, in a Prime Brokerage Overview presentation, [redacted] notes that [redacted] such as [redacted] and [redacted] and from any "[redacted]"[106]

165. Separately, after arguing that class members have all the price transparency they could possibly want in the real world, Dr. Hendershott attempts to have it both ways by arguing some class members with *more* transparency in the real world would be worse off if there were a level playing field of transparency in the but-for world. But clearly if there are genuine differentials among class members in terms of price transparency, his first opinion that class members already receive ample price transparency in the real world is mistaken. Moreover, to the extent any particular class members truly did receive special price transparency benefits from their relationships with prime brokers in the real world, those special price transparency benefits would continue in the but-for world if the class member chose to continue transacting OTC in the but-for world. No class member is harmed by the incremental transparency that platforms would bring.

166. Dr. Hendershott makes much ado out of the fact that seven hedge funds, out of thousands of class members, asked not to be included in the class definition in the case to purportedly "avoid the disclosure of trade secrets that those funds believe could potentially be discerned from their data."[107] Despite the small number of funds that asked to be excluded from the class, it is important to recognize that the information disclosed by each hedge fund in this litigation is far more comprehensive than the information that would be disclosed on a platform,

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344:12-345:11; [redacted] (September 2013 email from [redacted] saying "[redacted]").

[105] *See,* "[redacted]" September 3, 2010, [redacted] at '9823.

[106] *See,* "[redacted]" December 20, 2012, [redacted] at '7136.

[107] Hendershott Report ¶ 385.

such as all trade details (notional amount, price) with all counterparties on all platforms and, in many cases, locate requests of other positions. In this way, Dr. Hendershott conflates a hedge fund's concerns about information leakage from real-time anonymous trading on a platform with concerns about disclosing years of trading data and thousands of detailed and non-anonymized records of their trading positions with numerous prime brokers over the course of years.

167. Dr. Hendershott argues that there would be technical barriers to producing real-time data in the OTC market and provides examples such as the "[redacted]" and, in regard to third party data aggregator [redacted] the need to "[redacted]"[108] But such issues fall away when trading takes place on an anonymous all-to-all platform. A platform such as AQS can publish data on the transactions it executes at whatever level of detail it chooses.

168. Finally, Dr. Hendershott argues that [redacted][109] But this assumes away the presence of the conspiracy. If AQS were not boycotted, class members would have had a greater rate of participation on AQS, and thus Dr. Hendershott's methodology would imply there was substantial demand for incremental pricing data.

D. Defendants' Experts Fail to Establish that Actual World Stock Lending was Competitive

169. We explained in our Opening Report that "the stock lending market in the U.S. remains an opaque, OTC market that provides little price transparency with few pricing discovery mechanisms"[110] and that "In bilateral trade environments, a Prime Broker Defendant temporarily has a monopoly over a short seller."[111] In short, the real-world stock lending market fundamentally disadvantages all or virtually all class members, each of whom would be better off in a world where platforms were allowed to enter.

[108] Hendershott Report ¶¶ 401-403.
[109] Hendershott Report ¶ 411.
[110] Opening Report ¶ 19.
[111] Opening Report ¶ 253.

170. Contradicting these opinions, Dr. McCrary opines that "Many different prime brokers compete to provide shorting services,"[112] implying that the market is already competitive, and therefore cannot be improved further. This is sophistry—the introduction of platform trading, if not boycotted, would bring about *additional* and *incremental* competition above and beyond whatever level of competition existed in the real world, for all of the reasons we explain in our Opening Report.

171. Dr. McCrary also states that we have failed to provide evidence demonstrating that the Prime Broker Defendants, individually and collectively, (i) exercised substantial market power that (ii) enabled them to extract rents from their intermediation of stock lending activity.[113] He misstates our position on market power, claiming we have not opined that the Defendant Prime Brokers had the collective ability to prevent platform success since we performed no analysis to suggest that any threats by the prime brokers against clients who used the platform would have been effective. He also claims that we provide no empirical evidence that those who were allegedly threatened could have impeded the success of the platform.[114]

172. In making these statements, Dr. McCrary is again improperly assuming away the presence of the conspiracy. We have been asked by counsel to assume the conspiracy took place and was effective. We have reviewed record evidence supporting the notion that the conspiracy did take place.

173. The documentary evidence provides support for the Defendant's having a large market share. [redacted][115] This presentation reports that the [redacted] Therefore, this study reflects the [redacted]

[112] McCrary Report ¶ 106.
[113] McCrary Report ¶ 114.
[114] McCrary Report ¶ 104 n.115.
[115] [redacted] slide 2.

174. The market position of the Prime Broker Defendants was largely unchanged by 2017. Using assets under management ("AUM") as a measure of market power, the six Prime Broker Defendants had about 68% market share.[116] Our review of the Defendants' evidence indicates that [redacted][117]

175. Defendants also imply that because some class members "multi-prime," the market is competitive.[118] We disagree. First, Defendants' Experts do not quantify the prevalence of multi-priming in the market in any reliable way. The record evidence suggests [redacted][119] Thus even under the erroneous logic of Defendants' own experts, half of the market is *not* competitive.

176. Second, multi-priming is not the same as multilateral platform trading. Class members must still search sequentially and cannot instantaneously obtain prices from each of their prime brokers. These search costs create frictions, harming class members. As explained by personnel from [redacted] "[redacted]"[120] Thus it was well known in the industry that multi-priming does *not* bring the same benefits as multilateral trading, let alone anonymous platform trading. As a final point, the entire business proposition of AQS—which was blessed and reviewed by large financial firms including [redacted] and [redacted]—was that multilateral platform trading would be an improvement to the status quo processes in the market.

177. The presence and growth of multi-priming may have also been caused by the conspiracy. One reason hedge funds seek relationships with multiple prime brokers is to gain access to their diverse sources of available supply due to the fragmentation that exists in the OTC

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[116] The six Prime Broker Defendants control 68% of the Assets Under Management ("AUM") in the United States. *See,* "Prime Broker Pressures, Identifying and alleviating the tensions in the manager-prime relationship", *HFM Insights*, September 2017, p. 6.

[117] *See* "[redacted]" Not Dated, [redacted] at 2296-2310.

[118] McCrary ¶ 108.

[119] *See* [redacted] at '708, '757, '806.

[120] [redacted]

market since "each prime brokerage firm has a different inventory of lendable securities, and some are deeper than others."[121] Thus the observation about hedge funds being multi-primed does not indicate there is competition among the Prime Broker Defendants, but rather, demonstrates that the Prime Broker Defendants are able to use their market power to control access to pricing information and to their valuable supply of HTB stocks. By maintaining their hold on the intermediation of transactions between borrowers and lenders, the Prime Broker Defendants prevent access by those who seek supply of HTB stock from dealing directly with market participants that have supply.

178. Similarly, Dr. McCrary notes that "[b]ecause [redacted]"[122] Dr. Hendershott similarly argues that "[s]ome short sellers are "[redacted]" for [redacted][123] Again, these practices demonstrate the market power of the Prime Broker Defendants. Such pricing frictions would be mitigated in a but-for world of choice with all-to-all electronic trading platforms.

179. Dr. McCrary argues that "[p]rime broker competition for GC stock loans is enhanced by the fact that short sellers often have contracts with prime brokers that set the prices of GC borrows at a fixed price for an extended period of time." He argues that this demonstrates that even short sellers who wish to use a single prime broker can compare GC pricing offers from multiple prime brokers.[124] Dr. McCrary's opinion is based on the declaration of [redacted] But three data points provide no indication of the prevalence of this practice among thousands of market participants in setting rates for its GC, or clarification as to what is meant by an "extended period of time." Dr. McCrary also does not analyze the

[121] *See* "The Multi-Prime Broker Environment, Overcoming Challenges and Reaping the Benefits," *Merrill Lynch Global Markets & Investment Banking Group*, March 2007, p. 2.
[122] McCrary Report ¶ 240.
[123] Hendershott Report ¶ 73.
[124] McCrary Report ¶ 110.

significant operational costs associated with initiating prime broker relationships—costs that scale with the number of prime brokers, and that likely dissuade many class members from multi-priming.

180. Further, while Dr. McCrary cites the deposition testimony of [redacted] in support of his opinion, he ignores the evidence that [redacted] Thus, despite the deposition testimony which indicates that [redacted]

181. In his declaration, [redacted] states that the "[redacted]" [emphasis added][125] Likewise, [redacted] testified in his declaration that "[redacted]" [emphasis added][126]

182. [redacted] and [redacted] statements show that [redacted] Thus, contrary to Defendants' theories about [redacted]

183. We also find this evidence anecdotal and unreliable as an economic matter. Neither [redacted] nor [redacted] provide any specific examples of [redacted] Both declarations are pure *ipse dixit* submitted at the class certification stage in order to support Defendants' Expert Reports, rather than contemporaneous evidence created during the relevant time period.

184. In summary, Defendants' Experts have failed to establish that stock lending in the actual world was conducted under competitive market conditions. We maintain the conclusion

[125] [redacted] Declaration ¶ 14.
[126] [redacted] Declaration ¶ 15.

we reached in our Opening Report that the pricing of stock loans in the actual world reflects the exercise of monopoly power by Prime Broker Defendants in an opaque, name-disclosed OTC trading environment.

III. THE CRITICISMS OF DEFENDANTS' EXPERTS MISCHARACTERIZE THE BUT-FOR WORLD

185. Throughout their reports, Drs. Hendershott and McCrary assert we have not established that platform trading would have benefitted all class members in the but-for world. Below we respond to their primary criticisms and demonstrate that their criticisms of electronic all-to-all platforms in the but-for world is inaccurate and misleading.

186. We begin by reiterating that our but-for world is a world of choice, a key point the Defendants' Experts ignore in asserting that certain class members would be worse off in the but-for world of platform trading. We made clear in our Opening Report, and repeat below, that if certain class members prefer to trade bilaterally is those instances when they believe it benefits them, they could continue to do so in the but-for world. Nowhere in our Opening Report did we offer the opinion that in the but-for world, all trading would exclusively take place on electronic platforms. We instead recognized that trading would occur on platforms when preferable for some participants and bilaterally when advantageous for others.

187. We next address the Defendants' Experts' assertion that the AQS platform attracted unstable supply from lenders more likely to recall or rerate loans. We demonstrate that the opinions of Drs. Hendershott and McCrary conflict with empirical evidence that shows that across various measures of lending supply, including but not limited to recalls and stock loan pricing stability, that stock loans executed on AQS had the same stability as stock loans intermediated by the Prime Broker Defendants. We then correct the Defendants' Experts' many flawed depictions of platform trading in the but-for world and explain why their assertions are invalid and pertain to trading features that affect a small percentage of stock loans. Lastly, we respond to the Defendants' criticism of our determination of "w", the variable we use to estimate where in the range of OTC prices the AQS market-clearing price will fall in the but-for world. We demonstrate that our determination of "w" is robust and consistent with the factual evidence, evidence from academic literature and empirical analysis from this case.

A. Defendants' Experts Fail to Recognize that Our But-For World is a World of Choice.

188. Dr. Hendershott claims that price dispersion in the actual world is not due to opacity in OTC market prices but due to bespoke pricing between the Prime Broker Defendants and their clients that reflects the unique attributes of each class member, such as the market participant's lending reputation and the depth of relationship.[127] On this basis he argues that class members that benefit from bespoke prices would have been worse off in our but-for world.[128] Dr. McCrary follows suit, and echoes that in the but-for world, class members would no longer have access to the range of prices that exist in the actual world, and that the introduction of a platform option would eliminate their actual world option to trade at favorable OTC prices when prices converged to the platform price. Accordingly, he asserts that "some class members could have been … harmed by the introduction of a platform option."[129] Dr. McCrary also claims he is not aware of any common evidence that would allow for inferences regarding the class members "needs and preferences for OTC trading versus platform trading," thus necessitating individualized inquiry as to which class member would transact on a platform and which would not.[130] Drs. Hendershott and McCrary are incorrect and there is no need for individualized inquiry.

189. Our but-for world is a world of choice. Nowhere in our Opening Report do we take the position that all trades must be executed on all-to-all electronic platforms.[131] We were clear that our but-for world does not eliminate the option to trade OTC and allows for trades better suited to an OTC venue to be conducted OTC, at the discretion of the market participant. We do not, and do not need to, draw inferences concerning the preferences of any class member.

190. The Defendants' Experts disregard this element of choice that is foundational to our analysis and also disregard the fact that our damages methodology takes into account the

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[127] Hendershott Report ¶ 24.
[128] Hendershott Report ¶¶ 23-24.
[129] McCrary Report ¶¶ 135-136.
[130] McCrary Report ¶ 103.
[131] Opening Report ¶ 249 ("The existence of a platform offers market participants another *choice* [emphasis added] of how to conduct trades. This expansion of trading opportunities is beneficial for both the End-User and Beneficial Owner Subclasses. While there may be class members who opt not to trade on the platform initially, such a Class Member still benefits from the presence of the platform, since stock loans that take place on the platform influence the terms under which stock loans take place off-platform. Further, these class members still benefit from having the option to use the platform in the future.").

differences in prices paid by each class member in the actual world. As our model measures damages for each class member based on the difference between a class member's actual-world price and its but-for world price, it captures any differences between what class members may have paid in the actual world. If some class members systematically received superior prices relative to other class members in the actual world, as the Defendants' Experts assert, then such class members are awarded lower damages in our model.

191. We opined in our Opening Report that "Not all trades in the stock lending market would have migrated to AQS or other electronic platforms right away."[132] We recognized that some market participants may be slower than others to adopt electronic trading. These participants could continue to transact OTC for at least some portion of the Class Period, though they would have received better prices than they received in the actual world.

192. As set forth in our Opening Report, to be conservative our model incorporates an estimate of the maximum of either an incremental cost of transacting OTC or the sponsorship costs of transacting with a sponsor on a platform. We apply this maximum cost to every trade in our but-for world. Since we take the maximum, our approach eliminates the need to make inferences as to which transactions would happen on- or off-platform. It also eliminates the need to specify which platform trades are sponsored or not. This is explained in Section III.E.

193. Just as the Defendants' Experts assert that platform trading would harm market participants, they assert that choice harms market participants. Investors cannot be worse off in a but-for world that continues to allow them to trade OTC. They can only benefit from the addition of a platform.[133]

194. The evidence in this case makes clear that market participants wanted the option to trade OTC and on an electronic platform. For example, [redacted] explained that he [redacted][134] [redacted] sometimes cited as [redacted]

[132] Opening Report ¶ 288.
[133] Zhu Reply § II.
[134] [redacted] Tr. 219:7-14.

[redacted][135] [redacted][136] and [redacted][137] [redacted] likewise recognized that "[redacted]" on [redacted][138] [redacted][139] [redacted] for instance, noted that they had [redacted][140] [redacted][141] [redacted][142] [redacted][143] [redacted][144] [redacted][145] [redacted][146] For instance, [redacted][147]

[135] "Inside One Of the Most Secretive And Successful Hedge Funds In The World," Benzinga News, available at https://www.benzinga.com/news/16/11/8724328/inside-one-of-the-most-secretive-and-successful-hedge-funds-in-the-world.

[136] [redacted] ([redacted]),

[137] [redacted] ("[redacted]"); *see also* [redacted] ("[redacted]").

[138] *See* [redacted] Ex. PX208 ([redacted]), at '140; *see also* [redacted] Tr. at 250:15-251:21.

[139] PX 804 (showing a [redacted]).

[140] *See* [redacted]

[141] PX 815 at 3.

[142] [redacted] Tr. 262:18-264:7.

[143] [redacted] Tr. 262:18-264:7.

[144] PX 1908 ([redacted]).

[145] [redacted] Tr. 58:8-24 ("[redacted]") (objection omitted).

[146] PX 1908 at '197 [redacted]).

[147] [redacted] Tr. 36:4-16 ("[redacted]

195. Dr. McCrary further opines that certain market participants do not have any outside options for executing stock loans other than transacting with prime brokers since some participants are unwilling or unable to trade on a platform.[148] Dr. McCrary has provided no basis for how he, or for that matter any prime broker, would know whether a class member is unwilling or unable to trade on a platform. Rational market participants do not disclose their outside options, a point conceded by Dr. Hendershott in his deposition.

196. [redacted][149] [redacted][150] We think his advice prudent. [redacted][151] [redacted][152] Again, we agree. Dr. Hendershott's point is the same as ours: the option of trading via a platform has benefits.

197. We also assert that it is implausible that no outside option exists for class members, *absent a conspiracy*: the argument fails under the weight of the academic literature and the Defendants' own analysis we cited in our Opening Report. Using academic research and the Defendants' own documents,[153] we demonstrated in our Opening Report that as other market participants conducted increasing volumes of transactions on electronic platforms, this in turn would have created additional pricing improvements and further increased platform participation.[154] In his Opening Report, Dr. Zhu also explained how his search model

[redacted]) (objection omitted). *See* Tr. 14:21-27:18 ( ); *see also* PX1901 (documenting the same meeting); PX1908 ([redacted]

[148] McCrary Report ¶ 102.
[149] Hendershott Tr. 51:22-52:19.
[150] Hendershott Tr. 53:22-54:25.
[151] Hendershott Tr. 53:22-54:25.
[152] Hendershott Tr. 58:12-59:4.
[153] Opening Report ¶¶ 131-133, 152, 156.
[154] Opening Report ¶ 320.

demonstrated that "*all or virtually all* class members benefit from the introduction of a platform, whether or not they actually use the platform in the but-for world and whether or not they are sophisticated in the real world. This holds true even when a relatively small portion of class members actually begin using the platform."[155]

198. But platform trading was compromised by the conspiracy, which included the agreement to boycott the AQS platform and starve it of liquidity[156] and to withhold support from and boycott SL-x.[157] Thus absent the conspiracy, market participants (i) would have had a valid economic option beyond transacting with a prime broker and (ii) that option would be different from the actual world option of transacting on the boycotted AQS and SL-x platforms.

B. Defendants' Experts Are Incorrect to Claim That Electronic Platforms Would Attract "Poor Quality" Loans

199. Defendants' Experts assert that electronic platforms attracted unstable supply from lenders who were more likely to recall or re-rate their loans relative to their OTC counterparts.[158] Dr. McCrary presents exhibits showing [redacted][159] Defendants' Experts assert this purported unstable supply created an added burden on AQS platform participants since without their prime brokers, AQS platform participants had to actively monitor and manage their positions throughout the trading day on AQS.[160] Dr. Hendershott also asserts that this purported platform instability suggests that platform loans were unlikely to be an effective substitute for OTC trading for short sellers that tend to carry their positions for long durations or tend to borrow HTB stocks.[161] He claims these factors necessitate individualized inquiry of class members to ascertain whether such costs and risk of trading on an electronic platform are preferable to transacting with a prime broker.

200. The claim that platforms would attract lenders with unstable loan supply is not borne out by the evidence of actual trading on AQS. Lenders on the AQS platform included entities

[155] Zhu Opening Report Section V.C.1.
[156] Amended Complaint ¶¶ 209-218.
[157] Amended Complaint ¶¶ 219-253.
[158] Hendershott Report ¶¶ 103, 135.
[159] McCrary Report, Exhibits 1 & 3. Dr. McCrary also cites documents purportedly claiming that [redacted] (McCrary Report, n.82).
[160] Hendershott Report ¶99.
[161] Hendershott Report ¶ 138.

that also [redacted] Examples include [redacted] [162]

201. To provide a more systematic analysis of loan stability on the AQS platform, we examine the stock loans traded on this compromised platform and compare their stability, that is, their recall and re-rate activity, to those of stock loans made by the Prime Broker Defendants. We first demonstrate that [redacted] In a second test of comparative stability, we analyze price changes on open stock loans on the AQS platform and in the OTC market. [redacted] We conclude there is no basis to assert that in the but-for world, electronic platforms would attract loans of inferior quality relative to dealer-intermediated loans in the OTC market and thus common issues predominate. Our findings are consistent with the deposition testimony of [redacted] who testified that the [redacted] [163]

202. Dr. Hendershott does not provide any analysis of relative recall or rerate frequencies to support his claim that electronic platforms would attract lenders with more unstable loan supply. Dr. McCrary [redacted] At his deposition, Dr. McCrary testified that [redacted] [164] However, as presented, his Exhibits showing the

[162] *See* "[redacted]" June 7, 2010, [redacted] at '023.

[163] [redacted] explained that the [redacted] Tr. 302:11-25; 316:6-317:23, and that [redacted] Tr. 305:15-306:22; *see also* [redacted] Tr. 229:16-232:10, 291:22-294:11.

[164] Dr. McCrary asserts in deposition that he's "[redacted]" McCrary Tr. 101:6-9; 102:5-11; 103:24-104:8.

[redacted]

203. If we accept Dr. McCrary's definition of a recall based on his data in Exhibits 1 and 3, then [redacted]

204. In Section II.B, we discussed Dr. McCrary's Exhibit 1 and its measure of the Recall on File activity during 2012-2017 for [redacted] (data that Dr. McCrary did not analyze) of [redacted] But Dr. McCrary's Exhibit 1 (which analyzes [redacted]) and Exhibit 3 (which analyzes [redacted]) are not directly comparable since they differ as to the time periods analyzed. In **Exhibit III.1**, we constrain Dr. McCrary's Recall on File data from [redacted] and the [redacted] data to 2010-2013, since this is the same period Dr. McCrary analyzed for [redacted] in his Exhibit 3. This analysis shows [redacted]

EXHIBIT III.1
COMPARISON OF [redacted] RECALL RATES TO [redacted] AND [redacted] RECALL RATES, 2010-2013

[redacted]

Notes: Updated Prime Broker Transactions Data and Updated Pooled Prime Broker Data. "All Loans" includes loans for which temperature is not available.

205. Given that this data is derived [redacted] and because the liquidity on the platform was being further compromised by the conspiracy, these results are

notable. [redacted]

206. Dr. Hendershott claims the discovery record indicates that [redacted][165] But as [redacted] testified, [redacted][166]

207. Further, as we demonstrate below, [redacted] This undermines two of the Defendants' Experts' assertions. First, the Defendants' Experts claim that platform trading requires greater monitoring by market participants than OTC trading because of frequent price changes on the platform. Second, the Defendants' Experts claim that pricing on an anonymous platform would be more volatile than OTC pricing because of unstable supply on the platform. The fact that [redacted] undermines both of these claims.

208. In **Exhibit III.2** we compare how often the price of a stock loan (as measured on a CUSIP-Day basis using its weighted average loan cost) changed from the prior day for both dealer-intermediated and AQS platform traded stock loans. Our analysis establishes that in the

[165] Hendershott Report ¶ 131.
[166] [redacted] Tr. 229:16-232:10 ([redacted]).

[redacted]

EXHIBIT III.2
PERCENT OF CUSIP-DAYS WITH WEIGHTED AVERAGE LOAN COST CHANGES BY AT LEAST 1 BPS FROM PREVIOUS DAY FOR PRIME BROKER DEFENDANTS AND AQS
2010-2013

[redacted]

Notes: Updated Pooled Prime Broker Dataset and Updated AQS Data. A weighted average loan cost was calculated for each CUSIP-Day. A change in the weighted average loan cost occurs if CUSIP Day (t+1) had a different price than CUSIP Day (t) of at least 1 bp. For this analysis dates t+1 and t can be non-consecutive.

209. Dr. Hendershott also claims that [redacted][167] and asserts this is evidence of a platform's unstable supply. He offers Exhibit 8 which compares the duration of stock loans by each Prime Broker Defendant to AQS and asserts that this proves that "short sellers transacting on AQS would likely need to engage in much more monitoring and re-trading of their loans than they would if they borrowed stock OTC from the Prime Broker Defendants."[168]

210. There are numerous flaws we observe in the construction of Dr. Hendershott's analysis that undermine his conclusion. First, the comparison performed by Dr. Hendershott in Exhibit 8 is based on an apples-to-oranges comparison that does not restrict to overlapping CUSIP-Days in the OTC and AQS data. There can be many reasons for differences in the duration of stock loans executed on the platform in comparison to OTC stock loans, including differences in the composition of the underlying loan portfolios, such as the percentage of GC versus HTB stock loans. These factors need to be controlled for if the results are to be meaningful and Dr. Hendershott has failed to do so in his analysis. Second, Dr. Hendershott has

[167] Hendershott Report ¶ 135.
[168] Hendershott Report ¶ 135.

not controlled for the differences in duration that are the result of a *lender* recalling its stock, which is a supply issue, versus a *borrower* choosing to return its stock and close out its short position, which is not a supply issue. Third, his analysis is compromised by the structure of the data at Level 2: the data is not made available by contract and accordingly one cannot observe any *contract* activity, only activity at the *CUSIP-level*. Thus, there is no way to estimate the duration of a stock loan at the contract level, which we believe is the most meaningful unit of analysis. Lastly, any comparison to the AQS platform during the conspiracy period is unreliable: we would expect the duration of AQS platform loans to change as the platform obtains more volume.

211. Dr. Hendershott also forgets that our but-for world is a world of choice and there is no need for individualized inquiry. We recognize that if certain market participants care about duration risk in the but-for world they would have execution alternatives: they could continue to trade OTC if they believed an OTC loan would provide a better match for their target duration, or they could negotiate a stock loan with bespoke duration features using, for example, the AQS Negotiated Trade Facility ("NTF" - discussed further below). For the reasons we explain above, platforms which offer centrally located supply would mitigate duration risk in the event of a recall.

212. Lastly, we note that the AQS platform was able to support stock loans with long durations. By way of illustration, **Exhibit III.3** identifies the 10 AQS loans with the longest durations over the period 2010-2013. On the AQS platform, [redacted]

EXHIBIT III.3
[redacted] LOANS WITH LONGEST DURATIONS
2010-2013

[redacted]

Notes: Updated [redacted] Dataset; borrow transactions. Duration is measured in days.

213. Dr. Hendershott makes other unfounded claims about the instability of supply on a platform. He states that "Transacting on a platform exposes short sellers to the risk that they may be unable to replace recalled HTB stock quickly or cheaply enough to avoid incurring significant losses."[169] He similarly claims that "[redacted]"[170] In Exhibit 9, Dr. Hendershott purports to demonstrate that [redacted] in the real-world did not achieve frictionless matching between lenders and borrowers. In this exhibit he presents data on [redacted]

214. But these same frictions exist in the OTC world: on prime broker intermediated transactions, market participants are exposed to the exact same risk and the continuous monitoring of stock loan positions is a fact of life. We have already demonstrated in Section II.B that a monitoring burden is put upon market participants in the OTC world to scrutinize the

[169] Hendershott Report ¶ 136.
[170] Hendershott Report ¶ 133. Dr. Hendershott similarly opines that, "[redacted] One key component of a transaction between [redacted] In addition to [redacted] to the extent possible." *See* Hendershott Report ¶ 100.

effects of recalls and re-rates on individual trading strategies, and that the Defendants' Experts' assertions that the services provided by the prime broker eliminate this necessity does not square with the recall and re-rate activity we observe in the actual world data. This is one reason Dr. Hendershott's analyses are flawed: there are search frictions in the OTC market that Dr. Hendershott would have us ignore in pointing out that search frictions exist on AQS, and he makes no effort to compare these frictions to those same frictions that exist in the OTC market. For example, his Exhibit 9 merely tells us that frictions happen on AQS.

215. We note that in the current OTC structure, short sellers are entirely dependent on the abilities of the prime brokers with which they have established a contractual relationship to source HTB stock loan replacements. Replacing recalled shares is complicated in the actual world by the fragmentation of supply and demand among each market participant. In the but-for world, substantial supply would be centralized on platforms which would reduce the search costs of market participants when sourcing replacement supply.

216. Dr. Hendershott asserts that unlike prime broker intermediated transactions, [redacted] [171] However, we disagree that these operational differences resulted in meaningfully different economic outcomes, or that the outcomes on AQS were worse than in the OTC market.

217. [redacted] [172] [redacted]

[171] Hendershott Report ¶ 101.

[172] [redacted] Tr. 303:2-304:23 ("[redacted]

[redacted][173] [redacted]

[redacted][174]

218. Nonetheless, Dr. Hendershott asserts that the "AQS algorithm was not an equivalent substitute for broker judgment"[175] and he states that a "[redacted]"[176] Dr. Hendershott provides no evidence for his opinion that [redacted] It is not clear why an algorithmic solution would *per se* be inferior to manual and/or judgmental processes performed by individuals. Further, the Defendants' Experts' claims that positions on the [redacted][177] are, as discussed above, without merit.

219. Dr. Hendershott claims that another cause for more prevalent recalls on AQS was its inability to process voluntary corporate actions that were processed by the Agent Lenders for OTC transactions.[178] Dr. McCrary also makes a point of noting that corporate events can contribute to recalls and that in such cases, recall protection is a clear value-added service provided by the prime brokers.[179] Defendants' Experts make much ado about voluntary corporate events that they claim is relevant to determining the value of recall protection for a particular short seller.

220. We note that Dr. Hendershott does not provide any empirical evidence for this opinion other than [redacted]

[redacted]")

[173] *See* "[redacted]" November 13, 2009, [redacted] at '1763.
[174] *Id*.
[175] Hendershott Report ¶ 167.
[176] Hendershott Report ¶ 299.
[177] Hendershott Report ¶ 103.
[178] Hendershott Report ¶ 296.
[179] McCrary Report ¶ 62.

[redacted][180] [redacted][181] Dr. Hendershot has provided no empirical evidence on the frequency of the voluntary corporate actions he claims AQS was unable to handle. Therefore, he has provided no basis to conclude that these limitations, even if true, meaningfully affected the economic outcomes generated by the AQS platform.

C. Defendants' Experts Incorrectly Challenge the Features of Electronic Platforms in the But-for World

221. Drs. Hendershott and McCrary devote many pages of their reports to providing a critique of the AQS platform in the actual world and argue that platforms cannot handle the range of stock loan products and stock loan processing issues in the actual world that are necessary to meet the needs of many market participants. In this section, we address the principal arguments raised by Drs. Hendershott and McCrary that foster the impression that many stock loans are not suitable for trading on a platform like AQS. We note that, although much of this discussion centers on AQS specifically, we are not assuming that AQS itself is the sole platform in the but-for world. The but-for world platform (or platforms) is also *not* limited by AQS' limitations. In a competitive environment, a platform would develop the features its users or prospective users found valuable, including features that diminished or supplanted the role of traditional prime brokers.

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[180] Hendershott Report, ¶ 296 & ns.627-632.

[181] The [redacted] states that "[redacted]" *See also* [redacted]

222. We first explain that the Defendants' Experts ignore that, as we made clear in our Opening Report: the AQS platform as it existed in the actual world is not a final platform. The shortcomings cited by the Defendants' Experts relate to a platform that was continuously improving while it was contemporaneously starved for liquidity by the conspiracy. Just because the platform did not offer certain functionality under such constraints says nothing about the state of the platform absent the conspiracy. Moreover, the functionality AQS did not provide was largely irrelevant to the vast majority of stock loans transacted in the actual world. For example, although the [redacted] could not centrally clear non-cash stock loans, non-cash stock loans only represent about 5%[182] of all stock loans. Still, these trades would continue in the but-for world's OTC market with the benefit of enhanced transparency and competition. Moreover, there is no reason that in the future AQS or another platform will not be able to clear non-cash collateralized stock loans. The other alleged shortcomings of the AQS platform similarly mislead and overstate AQS's operational challenges.

223. Moreover, when evaluating the practical impact of these claimed limitations, it is useful to recognize that despite the conspiracy, the AQS platform processed stock loans trades involving [redacted][183] In our Opening Report, we explained that the AQS platform provided the crucial trade services including recalls, rerates, delivering shares to cover short sales, clearing, settlement, trade execution, and involuntary corporate actions. Through its NTF, AQS allowed participants to [redacted][184]

224. With respect to other bundled services offered by the prime brokers, such as margin lending, research, or capital introduction, these are services that market participants could obtain from a prime broker in the but-for world. Any service Defendants' Experts speculate exists in the actual world would remain in the but-for world, but be priced independently and competitively.

[182] Exhibit C.9.
[183] *See* Appendix C, Exhibit C.27.
[184] *See* [redacted]).

1. AQS is Not the Final Platform

225. In our Opening Report, we demonstrated that throughout the Data Period, AQS continuously adjusted its business strategy and enhanced its functionality in response to feedback from the Prime Broker Defendants, agent lenders and short sellers.[185] The evidentiary record includes [186] [187] The platform functionality and fee structure of AQS in the actual world is not, therefore, determinative of its or any platform's full potential and pricing in the but-for world.

226. [188] [189] [191] [192,193]

227. [194] [195] [196] As discussed earlier, Drs. Hendershott and McCrary are simply incorrect that the rate of recalls and rerates on AQS

[185] *See* Opening Report ¶ 470.
[186] For example, an email dated January 27, 2010, from *See*, Email from to "", January 27, 2010,
[187] Decl. ¶¶ 4-5.
[188]
[189] at '072.
[190] at '078.
[191] at '088.
[192] at '091.
[193] These systems are also discussed in *See,*
[194]
[195]
[196] Hendershott Report, Section IV.D.1.a.2. *See,* at '098.

was higher than the OTC market.[197] A natural inference is that the [redacted] worked, and that it recreated the relationship dynamics as they existed in the actual world between lenders and prime brokers.[198]

228. Dr. Hendershott's criticisms of AQS at a mechanical level are not compelling. [redacted][199] Second, the criticism that [redacted][200] is indicative of a limited liquidity, consistent with a boycott of the platform. If Dr. Hendershott's point here is that low liquidity hurts viability, we agree. Judging platform viability in the but-for world cannot be based solely on AQS's experience where it was affected by the boycott conspiracy. Third, the fact that the [redacted][201] simply reflects what economically self-interested market participants would do in the actual OTC market. For example, if a lender has lent Tesla shares at 100 bps to one counterparty and 110 bps to another counterparty, and must recall one borrower, which does it recall? Dr. Hendershott suggests that they would recall the 110 bps borrower, forgoing 10 bps of profit. This defies economic logic. [redacted] assumed, as we do now, that market participants are rational and motivated by self-interest.

229. Quadriserv was in tune with actual world conventions and adapted AQS to match that world. It was responsive when market participants showed demand for those conventions. For example, [redacted][202] Likewise, [redacted]

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[197] Section II.B.

[198] An alternative inference is that these relationships simply do not matter very much.

[199] Hendershott Report ¶ 299; *see* [redacted] Tr. 82:13-16 ([redacted]), 178:14-25 ("[redacted]").

[200] Hendershott Report ¶ 300.

[201] Hendershott Report ¶ 300.

[202] [redacted] *See,* [redacted]

[redacted][203] [redacted]

[redacted][204] Prime Brokers do this manually in the real world.[205]

230. [redacted]

[redacted][206] [redacted]

[redacted][207]

231. [redacted]

[redacted][208] The former would allow end-users to set their maximum (or minimum) acceptable rate, and the latter would automate the rerating process. This would eliminate most operational costs complained of by Defendants' Expert Mr. Savoldelli.[209] [redacted]

[redacted][210]

232. [redacted]

[redacted][211] [redacted][212] [redacted]

[redacted][213]

Crucially, this would be available for HTB securities, essentially securing access to the security, unlike the existing OTC market where agent lenders provide no guarantee that the stock is

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[203] [redacted]

[204] [redacted]

[205] McCrary Report ¶ 65 ([redacted] ").

[206] In the main, [redacted] *See,* [redacted]

[207] [redacted]

[208] [redacted]

[209] *See*, Savoldelli Report III.B.2. [redacted] *See,* [redacted] at Slide 18.

[210] [redacted]

[211] [redacted] the development of this product is indicative of the fact that these systems could be provided mechanically, by a platform.

[212] [redacted]

[213] [redacted]

available for borrow at a date in the future. This would have added functionality *on top of* existing OTC protocols.

233. [redacted][214] [redacted][215] this further illustrates Quadriserv's ability and desire to adapt to market conditions.

234. [redacted][216] [redacted][217] [redacted]

235. Whether Quadriserv in fact was able to fully implement these policies under the pressure of the conspiracy is not relevant; the relevant point is that a multilateral trading platform *could* implement these functions and that doing so would not be especially difficult at a technical level. Defendants' Experts' suggestion that these functions are unique to the OTC market simply ignores the record and the basic fact that *competition works*, and would result in a platform implementing many of these systems in the but-for world. Any operational rules of thumb that exist in the OTC market can be written into algorithms for AQS or other platforms. The AQS platform was evolving: in a competitive environment, it would have continued to do so.

2. Bespoke and Non-Anonymous Transactions

236. Dr. Hendershott asserts that stock loan transactions between prime brokers and market participants are essentially bespoke contracts that parties can negotiate along a number of dimensions. Conversely, [redacted][218] These arguments are misleading and oversimplified.

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[214] *See* "[redacted]", undated, [redacted] at 8713.
[215] *See* Section III.C.3.
[216] [redacted] *See,* [redacted]
[217] McCrary Tr. 67:13-69:5 ([redacted]").
[218] Hendershott Report, ¶ 99.

237. We disagree that most stock loan transactions are bespoke contracts involving highly customized features. [redacted][219] [redacted][220] For example, in 2010, [redacted][221]

238. Similarly, Defendants' documents reflect [redacted][222] [redacted][223]

239. The Defendants' Experts also fail to recognize the [redacted]

[219] For example, the securities lending desk procedures at [redacted] explained that "[redacted]). *See*, "[redacted]" February 2017, [redacted] at 0940. *See also*, Opening Report, Section VI. C-E.

[220] *See* "[redacted]," January 25, 2011, [redacted] at '1423.

[221] *See* "[redacted]," January 25, 2011, [redacted] at '1409.

[222] [redacted] at Slide 18. We note that [redacted] characterization of this initiative as [redacted]

[223] [redacted] at Slides 2-3.

[redacted][224] [redacted][225] [redacted][226] [redacted] We discussed the NTF in our Opening Report.[227]

240. As we have discussed in Section II.B, other allegedly bespoke features of the OTC market—namely recall and rerate protection—do not occur in any meaningful degree in the actual world.[228]

3. Non-cash Collateralized Loans

241. Dr. McCrary claims that "[redacted]"[229] and could not be traded on AQS since the OCC could not clear stock loans collateralized by non-cash collateral.[230] As evidence they are common, he observes the "[redacted] show that [redacted][231]

Dr. McCrary is wrong. Non-cash collateral stock loans are not common. His opinion reflects a fundamental misunderstanding of the data and overstates the significance of non-cash collateral.

242. First, we note that during the Class Period, [redacted] SEC Rule 15-c3-3 created the main

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[224] [redacted] *See,* "[redacted]" November 25, 2015, [redacted] at 3051. In another document, [redacted] *See* "[redacted]" January 25, 2013, [redacted] at 0367.

[225] *See* "[redacted]" January 25, 2013, [redacted] at 0367.

[226] [redacted] Tr. 342:15-343.25.

[227] Opening Report ¶ 192.

[228] *See* Section II.B.

[229] McCrary Report ¶ 101.

[230] McCrary Report ¶¶ 101, 219.

[231] McCrary Report, ¶ 101.

regulatory impediment to utilizing equity collateral in the US market. This rule effectively prevented U.S. broker dealers from pledging equity as collateral when borrowing securities from lending clients.[232] Other significant regulations that barred the use of equity as collateral in stock lending transactions in the U.S. market were ERISA and the Investment Company Act of 1940 which regulated registered investment companies' stock lending activities.[233] As a result of these regulatory impediments, there was more demand for cash stock loan transactions relative to equity-for-equity transactions. [redacted][234]

243. As we previously mentioned, [redacted][235]

244. [redacted] We believe this [redacted] reflects the different preferences of accounts and managers regarding the use of collateral.

245. As explained in our Opening Report, cash collateral can be reinvested by an agent lender or beneficial owner. Accordingly, some of these market participants want to establish account structures that would enable them to monitor the reinvestment of cash collateral in accordance with their governing investment guidelines and requirements. Such lenders might find it administratively necessary to segregate investment assets using reinvested cash proceeds

[232] Risk Management Association, "Equities as Collateral in U.S. Securities Lending Transactions," A Study Implemented by the RMA Executive Committee on Securities Lending, March 2011, p. 3 Critically, note that this is not an impediment receiving equity as collateral from their clients. We discuss this in the context of regulatory capitals costs. *See,* Section IV.
[233] Risk Management Association, "Equities as Collateral in U.S. Securities Lending Transactions," A Study Implemented by the RMA Executive Committee on Securities Lending, March 2011, p. 3.
[234] Appendix C, Exhibit C.9.
[235] *See*, [redacted]

from investment assets pledged for non-cash loans. Such account segregation would be necessary, for example, to address instances where reinvested collateral would need to be liquidated, such as when a stock was returned by a borrower. Conversely, for non-cash collateral, the lender would face different investment challenges. Lenders would find it necessary to track the mark to market value of non-cash collateral assets to ensure the market value of the collateral held was in excess of the market value of lent stock.

246. Accordingly, we believe [redacted] reflect such practices [redacted] says nothing about the point that Dr. McCrary makes—that a large number of agent lenders only engaged in non-cash transactions.

247. By way of illustration, the [redacted] Dr. McCrary would opine that this one account demonstrates that the class member "[redacted]" and would similarly include this one account among the [redacted][236] But Dr. McCrary overlooks the many other [redacted] accounts that also appear in the [redacted] In other words, Dr. McCrary would argue that account [redacted] As another example, in the [redacted]

[236] McCrary Report ¶ 101.

248. [redacted]

4. Information Leakage

249. Dr. McCrary claims that unlike OTC transactions, platform loans are "visible to market participants, potentially revealing shorting interest in a particular stock" and that "[m]aking this information public can be costly because it can cause the market to move against the short seller."[237] But Dr. McCrary's sole support for this claim is his conjecture that because seven short sellers would not permit the production of their anonymized data in this litigation and [redacted][238] it can be inferred that hedge funds generally would be reluctant to trade on a multilateral platform. This logic is deeply flawed.

250. We note first that hedge funds already conduct much of their trading in public markets including the stock, options and futures markets, all which trade on electronic exchanges with limit order books and real-time disclosure of transactions and prices. To our knowledge, no hedge fund has claimed that they will not trade long on the stock market since competitors will know their actions. In publishing real-time pricing data, such markets do not identify which market participants trade what, just that certain transactions took place and the prices of those transactions. The same would be true for stock loan platforms. An anonymous stock-loan platform would not need to provide the market with the names of the participants borrowing a stock.

251. In any case, sophisticated traders are capable of concealing their trading strategies in a number of ways even on public exchanges. One method used for concealing orders in a limit order book is an "iceberg order."[239] An iceberg order is one that splits a large bid or offer into

[237] McCrary Report ¶ 89.
[238] McCrary Report ¶ 89.
[239] James Chen, "Iceberg Order," Investopedia, accessed at https://www.investopedia.com/terms/i/icebergorder.asp .

segments, with the smallest portion priced such that it sits at the "top" of the limited order book, revealed to the public. The remaining volume is concealed in the depth of the book. Traders employ this strategy in many markets; there is no reason to think they could not do so on a platform for stock loans.[240]

252. Defendants' Experts likewise ignore that some borrowing volume in this market is driven by short selling that hedges other equity positions. As a definitional matter, hedge funds hedge. Short positions entered to hedge have substantially less information content and are generally not economically dangerous to reveal. Many such positions need not be executed in any particular security. Thus, for this substantial subset of the market, information leakage is simply not an issue.[241]

253. Ironically, Defendants' Experts' primary source material for the proposition that information leakage is a concern for class members centers on information leakage *to prime brokers*.[242] In other words, the hedge funds expressed concern that prime brokers could use their knowledge of their clients' trades to profitably trade ahead of them and benefit from the market movement caused by their clients' trades.[243] Defendants' Experts' citation to SEC comments about the fear of information leakage is similarly misleading. Those comments specifically note that information leakage is dangerous only when the identity and strategy of the trader are

[240] Hendershott Report ¶ 70 (noting that many short sellers are sophisticated).
[241] Information leakage is most concerning for large, directional short sales. *See* Savoldelli Report, ¶63 (discussing short selling of [redacted] stock). These particular trades may occur in the but-for world OTC market instead, if needed. Such trades would still, of course, benefit from the platform's pricing discipline.
[242] *See,* Hendershot Report ¶ 166 n.323.
[243] Dr. Hendershot cites to a paper by James R. Hedges IV, "Hedge Fund Transparency", in The European Journal of Finance. (Hendershott Report, n.323). This paper, on page 413, says, "The greatest fear of fund managers is that their transactions and positions become known by other traders, putting them at a competitive disadvantage. This can easily happen to a manager that has entered into a sizable, but relatively illiquid position. For example, if a large hedge fund invested more than $500M in a given security that was thinly traded, **and the market maker in this security knew of this position, then the market maker could easily work against the manager.**" (emphasis added); Goldman To Clients We May Be Front-Running You, Business Insider (discussing a client informational letter issued by Goldman Sachs stating "We [Goldman Sachs] may trade, and may have existing positions, based on Trading Ideas before we have discussed those Trading Ideas with you. We may continue to act on Trading Ideas, and may trade out of any position, based on Trading Ideas, at any time after we have discussed them with you. We will also discuss Trading Ideas with other clients, both before and after we have discussed them with you."); Investment News: "Image repair: Mutual funds still recovering 10 years after scandal", available at https://www.investmentnews.com/image-repair-mutual-funds-still-recovering-10-years-after-scandal-53614 (discussing front-running by Goldman Sachs and Morgan Stanley).

disclosed.[244] The only market participants with potential access to such information are Defendants themselves in the current world.

254. Further, the Defendants' Experts also overlook the fact that daily short selling activity is already publicly disclosed at the end of every trading day for the NYSE, NYSE American, NYSE Arca, NYSE National and NYSE Chicago exchanges. TAQ Group Short Sales files are made available to market participants daily and distribute Regulation SHO data that includes, for each CUSIP, the short exempt volume (total share of all short exempt order executions), short volume (total share volume of all short order executions), and total volume (total share volume of all order executions) and market (exchange, such as NYSE).[245]

255. Lastly, the fact that certain hedge funds have chosen not to provide their data in this litigation says nothing about short sellers' unwillingness to trade on a platform due to fears of information leakage in disclosing their trades. It is relevant only in demonstrating that seven short sellers were uncomfortable revealing all the transaction level detail about all their trades over a multi-year period since the data made available in this litigation is more specific than would be made available on a platform. In fact, [redacted] These are two of the firms that chose not to provide data. Again, to emphasize, class members' concerns with information leakage pertain primarily to their *prime brokers*. These hedge funds' decision to opt out of the class is not informative about their preferences in the actual and but-for worlds.

5. Stock Loans are Well-Suited for Platform Trading

256. Dr. Hendershott identifies additional reasons that stock loans are ill-suited to trading on a platform such as AQS including that stock loans are not standardized products.[246] In our Opening Report, we cited to evidence from other markets to demonstrate that during the Class Period, platforms were widespread and growing for financial instruments similar to stock

[244] Savoldelli Report ¶ 64 fn.90; "Short Sale Position and Transaction Reporting," Securities and Exchange Commission, June 5, 2014, at p. 51 ("**To the extent that copycat traders could detect fundamental short selling in transaction marks**, they could mimic fundamental short sellers and profit from their research without incurring the cost of that research.") (emphasis added). Note also that the issue relates solely to fundamental trading, that is, directional short selling, rather than hedges or high-frequency trading.
[245] https://www.nyse.com/publicdocs/nyse/data/Daily_Short_Volume_Client_Spec_v1.3.pdf.
[246] Hendershott Report ¶¶148-159.

loans.[247] Among these similar financial instruments were two classes that we felt were especially pertinent to assessing whether stock loans were well-suited to trading on electronic platforms: physically settled derivative contracts, such as futures, and repurchase agreements (also known as "repos").[248] Dr. Hendershott argues that our comparison of the stock loan market to these two markets is flawed. He claims that while futures contracts are "standardized with fixed-prespecified maturity dates," stock loans are not and that their maturity is "determined by whether a recall, a return or a rejected re-rate occurs."[249] As to repo securities, he argues that this market has not migrated to anonymous platform trading despite its having adopted electronic trading.[250] We disagree with his opinions.

257. First, as explained in our Opening Report, at both Level 1 and Level 2, the relevant economic attributes of stock lending transactions are highly standardized and include the following: (i) counterparty; (ii) security description; (iii) term of the loan; (iv) collateral type (cash versus securities); (v) collateral haircut; and (vi) loan cost.[251] To underscore that these standard attributes make stock loans viable for platform trading, we note that billions of dollars of stock loans were transacted on the AQS platform. That is indisputable. The AQS product demonstrated that stock loans have standardized economic terms that make them suitable for electronic trading and central clearing.

258. The evidence further indicates that [redacted] Such activity shows that the platform was drawing additional supply from the Level 1 market which was being matched to demand at Level 2 in a way the existing OTC market structure did not.[252]

259. Despite the actual trading that has taken place on AQS, Dr. Hendershott insists that because stock loans do not have pre-specified maturity dates, they are unsuitable for platform trading.[253] According to Dr. Hendershott, this in turn renders our comparison to a futures

[247] Opening Report ¶ 134. For his part, Mr. Pridmore did not explain why Professor Zhu's and our analysis of comparable markets are inapposite, stating only [redacted] Pridmore Tr. 209:19-22:14, 287:11-24.
[248] Opening Report ¶ 138-144.
[249] Hendershott Report ¶ 209.
[250] Hendershott Report ¶¶ 179, 204.
[251] Opening Report ¶ 60, Section VI.
[252] Opening Report ¶ 250.
[253] Hendershott Report ¶ 209.

contract, which has an expiration date, improper.[254] In making these arguments, Dr. Hendershott not only ignores the volumes of stock loans that traded on AQS, but the electronic platform trading in other securities that also do not have pre-specified maturity dates. For example, American style options have a stated maturity date but can be exercised (i.e., recalled or returned) at any point prior to maturity and have been traded on an exchange for decades.[255]

260. The Defendants' Experts also ignore industry research that connects the trading of stock loan contracts with our exemplary futures, options and repo markets. As one example, 2009 research from Finadium titled, "Resetting the Roadmap: Managing in a New Securities Lending Environment for Beneficial Asset Holders," observes that "[a]dvocates of CCPs [central counterparty clearing houses] note their wide industry participation in other markets, such as LCH.Clearnet for European repo and the Options Clearing Corporation for US options. Single stock futures, an exchanged-traded product with similarities to stock loans, were also already traded and cleared using CCPs."[256]

261. Dr. Hendershott opines that our comparison to the repo market is flawed because there is limited anonymous trading that exists in that market.[257] Dr. Hendershott misses the point that there *is* electronic trading in the repo markets, and thus our comparison to stock loans in the but-for world remains valid. One example of such a platform is the MTS electronic repo platform, which notes that, "While most interdealer and dealer-to-client (D2C) trading platforms are stand alone and do not interact with one another, new functionality from MTS simply segregates the trading activity on a single platform. This allows not only for simplicity in technical implementation and integration for dealers but also the choice and control for certain data to be seamlessly shared between these dealers and their clients."[258] Regardless, the but-for world platform need only be viable for economic benefit to be conferred on all class members.[259] Viability, not majority market share, is the sufficient condition for impact.

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[254] Hendershott Report ¶ 209.
[255] https://www.call-options.com/american-option.html.
[256] *See* "Resetting the Roadmap: Managing in a New Securities Lending Environment for Beneficial Asset Holders," *Finandium*, Third Quarter 2009, [redacted] at 4307.
[257] Hendershott Report ¶179.
[258] *See* "The Next Evolution of Electronic Repo Trading for the Sell-side and the Buy-side," *Finandium,* September 19, 2019, available at https://finadium.com/the-next-evolution-of-electronic-repo-trading-for-the-sell-side-and-buy-side/.
[259] Zhu Reply §§ II, IV.

262. In our Opening Report, we also demonstrated how the common evidence showed that there was a convergence of factors exerting competitive pressure on the Prime Broker Defendants and the stock lending OTC structure in the years leading up to and during the Class Period, including the emergence of multilateral trading in other OTC markets that, relative to stock lending transactions, had less trading volume and less standardization in their economic attributes.[260] Here we also described how the 2008-2009 financial crisis increased regulatory support for electronic trading platforms[261] and how the Prime Broker Defendants were aware of the threats to their market share and profitability from the emergence of electronic platforms in the stock lending market.[262] We also explained how features of the Level 1 and Level 2 markets made them suitable for platform adoption.[263] Lastly, we explained how minimal steps were needed to link the lender and borrower segments of this market and eliminate the prime broker as middleman.[264] The Defendants' Experts make no efforts to refute these points from our Opening Report.

263. In this report, we re-emphasize that during the Class Period there was growing interest in all-to-all electronic platforms in both the stock lending and repo markets. For example, one 2015 industry study cited by the Defendants' Experts notes "[t]here has been an increase in peer-to-peer lending in the last two to three years, although this still remains a very small percentage of the overall securities finance industry. This growth has been between buy-side participants such as insurance companies and pension funds lending to each other, rather than transacting with banks and broker/dealers as an intermediary. Increasingly, there are now companies offering tools to facilitate peer-to-peer transactions on trading platforms. Examples include the Elixium and DBV-x platform, which support both repurchase agreements (repo) and stock lending transactions."[265]

264. The Defendants' Experts also ignore the evidence that demonstrates the [redacted]

[260] Opening Report Section VI.B.1.
[261] Opening Report Section VI.B.2.
[262] Opening Report Section VI.B.3.
[263] Opening Report Section VI.C-D.
[264] Opening Report Section VI.E.
[265] *See,* Bassler, Peter and Ed Oliver, "Securities Lending Best Practices: A Guidance Paper for Institutional Investors," Securities Finance Trust Company, 2015, p. 11.

[redacted] For example, [redacted][266] As another example, [redacted][267] [redacted]"[268] [redacted][269] [redacted][270]

D. Defendants' Criticisms of But-For World Prices and "W"

265. Dr. McCrary asserts that our determination of "w" does not reflect an "economically sound methodology."[271] He asserts that our estimate fails to consider the supply and demand elasticities of stock loans over time, and that, after performing various empirical analysis to estimate potential values for "w" we inappropriately applied judgement in making a final

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[266] [redacted] April 2010, [redacted] at 0702.
[267] *See,* "[redacted]" July 13, 2015, [redacted] at 9379. *See also,* [redacted] 2009, [redacted] at 3868.
[268] *See,* "[redacted]" Not Dated, [redacted] at 2219.
[269] *See,* "[redacted]" September 3, 2010, [redacted] at 9827.
[270] *See,* "[redacted] May 26, 2010, [redacted] at 9438.
[271] McCrary Report, ¶ 268.

determination of the values of "w" for Cold, Warm and Hot stock loans.[272] He also challenges our decision to have a single temperature category for Hot stock loans and arbitrarily cuts this category into 10 sub-categories to generate alternative values of "w" that differ from our single estimate.[273]

266. We have relied upon an extensive body of analysis in reaching our determination of "w" and platform pricing in the but-for world.[274] This body of analysis included factual evidence, evidence from academic literature and empirical analysis from this case. Dr. McCrary disregards the totality of this evidence from our Opening Report and instead argues that our methodology is flawed because we didn't perform one analysis that he claims we should have performed – that is, estimating supply and demand elasticities. But Dr. McCrary notably chooses not to measure elasticities, nor does he demonstrate that such an estimation could be done accurately given the data available to us.

267. In forming his criticisms of "w", Dr. McCrary also ignores the testimony set forth in our Opening Reports that the results of any pricing analysis that compares prices on AQS to OTC prices cannot legitimately be evaluated without taking into consideration the impacts on the analysis of pricing opacity and price discrimination caused by the Defendants' market power.[275] Accordingly, as we explained, any comparison of prices on a compromised platform to prices in the OTC market structure will necessarily be imperfect.[276] These issues would of course, spill

[272] McCrary Report, ¶¶ 268-269.
[273] McCrary Report, ¶ 274.
[274] In our Opening Report we discussed the roles played by prime brokers as intermediaries in the stock loan market, and the risks associated with these functions, to conclude that this intermediation does not add significant economic value to market participants (Opening Report, Section V). We discussed the features of emerging electronic platforms developed specifically for the stock loan market (Section VI) and noted that, consistent with our conclusions, the factual record in this matter reveals that the Prime Broker Defendants recognized that these emerging electronic platforms threatened their profitability (Section VI). We examined in greater detail the operational features and transactions executed on AQS to explain why these platforms were economically viable absent the conspiracy (Section VII). We also provided an analysis of electronic platforms in comparable financial markets to further support our conclusions on the viability of platforms in the stock lending markets (Section VI.B) and examined the empirical evidence from academic studies on transparency and multilateral trading in other OTC markets (Section VIII.C.) Finally, we analyzed the extensive record of dealer-intermediated stock loan transactions executed by the Prime Broker Defendants (Sections IX – XII).
[275] *See,* Opening Report, ¶¶ 227, 452.
[276] As noted in our Opening Report, "we stress that any comparison of prices on a compromised platform to transaction prices in the current OTC market structure will necessarily be indicative, but imperfect for the reasons we have noted. If the Prime Broker Defendants were actively working to suppress trading activity on AQS, as is alleged, this will reduce the number of trades undertaken and cause the comparison to be more imperfect than without this interference. In addition, while volume on AQS suggests that stock lending is suitable for electronic

over into any measures of supply and demand elasticities Dr. McCrary asserts we should have performed, just as they spill over to his assertion that we should have constructed alternative values for "w". Dr. McCrary ignores this important factor.

268. Dr. McCrary presents Exhibit 23, which is a summary of Table XI.15 from our Opening Report. This exhibit presents our estimates of "w" to which he adds an additional column to reflect the "w" we used to calculate damages. He claims that the "different values of "w" selected by Drs. Asquith and Pathak create conflicting incentives for beneficial owners and borrowers" since "beneficial owners would prefer high but-for platform prices and borrowers would prefer low but-for platform prices."[277] He makes a similar argument with his Exhibit 24 wherein he disaggregates our Hot stock category into ten arbitrary subcategories (of various widths for which he provides no basis, widths that include [redacted] and shows that depending on which alternative we use for estimating "w" (for example, whether we use an average "w" or median "w") that it can favor either the Beneficial Owner or the End-User Subclass across his Hot thresholds. Despite cutting our Hot category into 10 groupings of various widths, Dr. McCrary does not propose specific thresholds for our model.

269. But Dr. McCrary confuses the role of an economist with that of an advocate. We determine the market equilibrium price in our model on the basis of objective market evidence, not the financial interests of a particular class members. We agree that lenders prefer a higher price and borrowers a lower price and that it is precisely because there is an implicit pricing conflict in the negotiation of each and every stock loan transaction. This pricing conflict holds, whether a trade is executed on a platform or OTC. But this simple fact has no bearing on our determination, as economists, regarding how to calculate the appropriate value of "w." That both lenders and borrowers endeavor to obtain the best possible price supports our conclusion that, absent a conspiracy, market participants would transition to a platform that offered better

trading, it still remains a small fraction of overall stock lending activity in the market. Moreover, all comparisons of prices on AQS to Prime Broker Defendant intermediated transaction prices are from a period where OTC prices were opaque and search costs high, meaning it is difficult for beneficial owners and short sellers to compare market prices. *See,* Opening Report, ¶ 215.

[277] McCrary Report, ¶ 272.

prices. Beyond that, we have not given any consideration to "conflicting incentives" of lenders and borrowers and such considerations are irrelevant to our opinions in this case.

270. Our "w" is, however, based on our empirical analysis of the distribution of stock loan prices for millions of CUSIP-Day transactions in the dealer-intermediated OTC market at Levels 1 and 2, and on AQS, where we can observe the distribution of prices on the AQS platform resulting from millions of CUSIP-Day negotiations between willing lenders and willing borrowers. On the totality of these data, we then determine where in the spectrum of OTC prices the negotiated AQS prices settled and estimate values for "w" that include averages and the median. Based on these results, our theoretical framework, and the body of evidence we studied in this matter, we then make a final determination of the best values of "w" for our estimation of prices in the but-for world. Throughout our Opening Report, we emphasized that AQS is a compromised platform during the Class Period and its prices, and thus its implied value of "w", cannot be definitive. At the same time, we, as economists, objectively arrived at the most reliable measure of "w" we could, based on all the information and data available to us.

271. Below, in **Exhibit III.4**, we replicate Dr. McCrary's Exhibit 24 and add a column to show the standard deviation of "w" for each average lending fee threshold. This analysis illustrates the fallacy of Dr. McCrary's argument that our values of "w" should have a level of precision which they cannot.

272. Across the spectrum of prices we observed to compute "w" under Method 1 (which constrains the set of AQS prices to those between WALC P1 and WALC P2), we first observe that the "w" values at different lending fee levels [redacted] Under this pattern, the data does not indicate there is any basis to change our value of "w"; at the extreme upper tails of Hot stock loans (lending fees in excess of [redacted] the "w" is between [redacted] while at the low end [redacted] the "w" is similarly at [redacted] Under this method, the data establishes that a single "w" value across the spectrum of prices is appropriate.

273. The analysis for Method 1 also shows there is a wide range of "w" values within each of Dr. McCrary's Hot categories. This wide range further undermines Dr. McCrary's suggestion that there should be greater "w" specificity at these levels. At each lending fee threshold, the standard deviation around "w" is larger than the difference between the "w" values he assigns to

each level. For example, while the range of "w" values is between [redacted] at all average lending fee levels, the standard deviation across these levels is from [redacted] The variation in "w" values thus swamps the small differences between temperature categories that Dr. McCrary observes.

274. Turning to Method 2, the pattern in "w" takes a different shape: as lending fees increase, the "w" increases slightly up to [redacted] where "w" rises to [redacted] But the fact that there is a different shape in the "w" function under Method 2 (which also has large standard deviations) in comparison to Method 1 indicates that one or both methods may be unreliable. Turning to Method 3, we observe a third pattern in the "w" data: a relatively stable value of "w" across higher levels of lending fees until it increases at [redacted] the "w" values have extreme standard deviations, suggesting these values are also unreliable.

EXHIBIT III.4
REPLICATION OF MCCRARY EXHIBIT 24 WITH STANDARD DEVIATIONS

[redacted]

Notes: Updated [redacted] Dataset and backup to McCrary Report Exhibit 24.

275. As we explained in our Opening Report, we looked to four sources of information to establish our thresholds for each temperature of stock loan prices: academic literature,[278] the evidentiary record,[279] AQS data,[280] and the Prime Broker Defendant data.[281] In our opinion, there is no basis to change the thresholds for "w" established in our Opening Report. (In addition, as we note below in our discussion of Damages in Section IV, our temperature thresholds continue to hold. Our threshold to be categorized as GC is any stock whose WALC at

[278] Opening Report, ¶¶ 416-418.
[279] Opening Report, ¶¶ 419-421.
[280] Opening Report, ¶¶ 422-242.
[281] Opening Report, ¶¶ 425-426.

Level 1 is [redacted] any stock loan with Level 1 WALC at [redacted] is categorized as Hot; and any stock loan with Level 1 WALC [redacted] is categorized as Warm.

E. Dr. Hendershott Vastly Overstates the Costs Associated with Platform Trading.

276. Dr. Hendershott criticizes our damages model for failing to properly account for the costs associated with platform trading which, he concludes, would be substantial.[282] Dr. Hendershott's conclusion and methodology, as we detail in this section, fail to hold up under scrutiny.

277. Dr. Hendershott's cost analysis focuses on the platform fees, CCP fees and capital costs for a platform. The capital costs faced by a prime broker sponsor on a platform are largely the same as the capital costs faced by a prime broker in the current OTC market. Remarkably, using Dr. Hendershott's estimate of capital costs for a prime broker sponsor implies that prime brokers in the OTC market, paying the same capital costs, would *lose* money on general collateral, warm, and some HTB transactions in the actual world. Dr. Hendershott calculates the capital cost associated with actual world stock loans to be [redacted][283] The weighted average spreads on GC and Warm transactions—which represent a large majority of the notional volume in the market—is [redacted][284] Since the capital costs are greater than the spread, under Dr. Hendershott's inflated assumptions prime brokers already would be losing money on a large fraction of trades in the actual world.

278. Moreover, consistent with Defendants' Experts' analysis that stock lending "pays" for an assortment of non-stock lending services that short sellers receive "for free,"[285] the revenue Prime Broker Defendants earn on this spread must account not only for the costs Dr. Hendershott calculates, but also those incurred to provide an assortment of other supposed services. Yet, the average spreads in the actual OTC market earned by the Prime Broker Defendants on GC and

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[282] *See generally*, Hendershott Report at Section IV.C and Appendix C.

[283] Hendershott Report, Appendix C, ¶ 19. The total capital costs Dr. Hendershott computes as being incurred by Prime Broker Defendants for sponsoring beneficial owners and short sellers in the but-for world are [redacted] Of this amount, [redacted] are costs Dr. Hendershott associates with transactions of the Prime Broker Defendants would have to incur on their transactions with CCPs, which did occur in the actual world. Therefore, the remaining costs of [redacted] are, according to Dr. Hendershott, the costs associated with the Prime Broker Defendants' bilateral transactions with beneficial owners and short sellers, transactions that also occurred in the actual world.

[284] Appendix D, Exhibit D.3.

[285] See Hendershott Report at Sections III & IV; McCrary Report at Section 2.1.

warm securities were significantly less than the capital costs Dr. Hendershott asserts they incurred in conducting this business. If Dr. Hendershott's cost calculations are real, then, the Prime Broker Defendants have been systematically losing money from their stock lending business during the entirety of the Class Period. That the Prime Broker Defendants were not losing money—they were, in fact, continuing to make significant profit—by itself exposes the gross inaccuracy of Dr. Hendershott's assumptions.

279. Dr. Hendershott is wrong on these costs. Conceptually, Dr. Hendershott makes the critical error of assuming that prime brokers calculate their costs on a per transaction basis, as though they had no measures by which to mitigate these costs. Prime brokers calculate their regulatory capital in aggregate, netting exposures on their balance sheet to substantially reduce their capital requirements and the associated costs. Dr. Hendershott makes other rudimentary mistakes, artificially inflating his figures. Between his model's conceptual and mechanical flaws, Dr. Hendershott over-estimates costs associated with regulatory capital by [redacted] and margin by [redacted][286] Even applying Dr. Hendershott's stylized model, corrected for his errors, Dr. Hendershott over-estimates costs by up to [redacted][287]

280. Dr. Hendershott's cost analysis makes four fundamental errors.[288] *First*, he misreads or disregards the applicable regulations and CCP rules, causing him to assume that CCPs are less cost efficient than OTC trading, in direct contradiction to Pillar I of Basel III.[289] *Second*, his analysis fails to appreciate the use of client-margin or un-lent assets as a means of mitigating market participants' risk and related regulatory capital charges. *Third*, he analyzes margin costs by reference to cherry-picked record evidence, failing to understand how CCPs work in the actual world. *Fourth*, he wrongly assumes that prime brokers do nothing, such as netting, to mitigate their risk or costs, despite their role as market makers.

281. The following sections outline these substantial errors in detail. Platform trading costs include: (1) regulatory capital costs; (2) costs associated with the use of a central counterparty, including those associated with initial margin and default fund requirements; and

[286] *See* Exhibit III.5 below.
[287] *See id*.
[288] Dr. Hendershott's cost analysis makes further errors discussed in more detail in Dr. Zhu's reply report. *See* Zhu Reply § III.B.
[289] *See,* Basel Committee on Banking Supervision reforms - Basel III, Pillar 1, available at https://www.bis.org/bcbs/basel3/b3summarytable.pdf.

(3) platform fees. We address these three cost categories in Sections VIII and XI of our Opening Report. To use the nomenclature from our Opening Report, categories (1) and (2)—regulatory capital costs and costs of transacting with a CCP – are components of F_s. When a market participant trades OTC, it pays only the regulatory capital costs. But since we assessed F_s on all trades, sponsored or not, we have conservatively covered its associated regulatory capital costs. Even though, in the but-for world, beneficial owners and short sellers may trade on a platform without sponsorship, to be conservative we focus on the case of fees with sponsored access and conservatively assess a sponsorship fee on all trades. The third cost category considered in our Opening Report is F_p, which represents category (3) platform fees.

282. Below, we recreate Dr. Hendershott's Exhibit 16 and place it side-by-side with corrected figures.[290] These corrected figures respond conservatively to Dr. Hendershott, point-for-point.

EXHIBIT III.5
SUMMARY OF SPONSORSHIP COSTS
CORRECTING FOR METHODOLOGICAL ERRORS (BPS)

[redacted]

283. As illustrated in **Exhibit III.5**, we calculate sponsorship costs of [redacted] and [redacted] absent any additional savings from, among other things, netting. While we believe the short seller costs set forth in our Opening Report are and remain a reasonable estimate given all the additional cost savings that would have been available to the prime brokers, we conservatively use a sponsorship cost of [redacted] to incorporate Dr. Hendershott's criticisms. The sponsorship cost for [redacted] is [redacted]

[290] *See generally* Hendershott Tr. at 264:15-267:21.

1. Dr. Hendershott's Methodology for Calculating Clearing Sponsors' Regulatory Capital Costs is Fundamentally Flawed.

284. Dr. Hendershott's analysis of regulatory capital costs is flawed, both conceptually and mechanically. Regulatory capital costs reflect clearing sponsors' cost of maintaining minimum regulatory capital sufficient to account for credit counterparty risk. These costs are correlated with risk, and offsetting exposures reduce the costs.

285. In his Opening Report, Dr. Zhu used a "stylized" calculation to illustrate the incremental benefit of clearing a stock loan trade for agent lenders.[291] Dr. Hendershott uses this methodology to analyze the capital costs of prime brokers from transacting stock loans with lenders, borrowers, and CCPs in the but-for world, but this is incorrect.[292] Dr. Zhu explains in his reply that this approach is not appropriate for costs other than those borne by agent lenders.[293] For prime brokers, significant modifications are necessary.[294] We agree.

286. The approach to capital costs described by Dr. Zhu calculates capital costs as a product of an entity's risk-weighted assets ("RWAs"), capital ratio, and the cost of capital.[295] RWAs are calculated by applying a regulatory risk weight to an exposure amount.[296] The Collateral Haircut Approach ("CHA") determines the "exposure amount" for purposes of calculating RWAs.[297] For purposes of calculating the exposures created by a stock loan, the values of the stocks loaned and the cash provided as collateral are subject to certain standard supervisory haircuts provided in the relevant federal regulations.[298] The CHA accounts for the risk of fluctuations in the value of stocks on loan by allowing for unfavorable movements in the

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[291] Zhu Report ¶ 167.

[292] Hendershott Tr. 113:19-114:18 ("[redacted]").

[293] Zhu Reply Report § III.B.

[294] *Id*.

[295] Capital Costs = RWAs x Capital Ratio x Cost of Capital.

[296] RWAs = Risk Weight x Exposure Amount. *See generally* 12 CFR § 217.37.

[297] Hendershott Report, Appendix C, ¶ 8; 12 CFR § 217.37.

[298] Hendershott Report, Appendix C, ¶ 10 and CFR § 217.37. Dr. Hendershott claims "[t]he haircuts for determining the appropriate amount of regulatory capital for a given exposure are standardized under Basel III rules." If, by "standardized," he means that haircuts had to match the supervisory haircuts he used, he is incorrect. CFR § 217.37 allows banks to use either certain supervisory haircuts (§ 217.132 (c)(3)) or, with prior written approval of the Board, haircuts based on its own internal estimates of the volatilities of market prices for the securities creating the exposure (§ 217.132 (c)(4)).

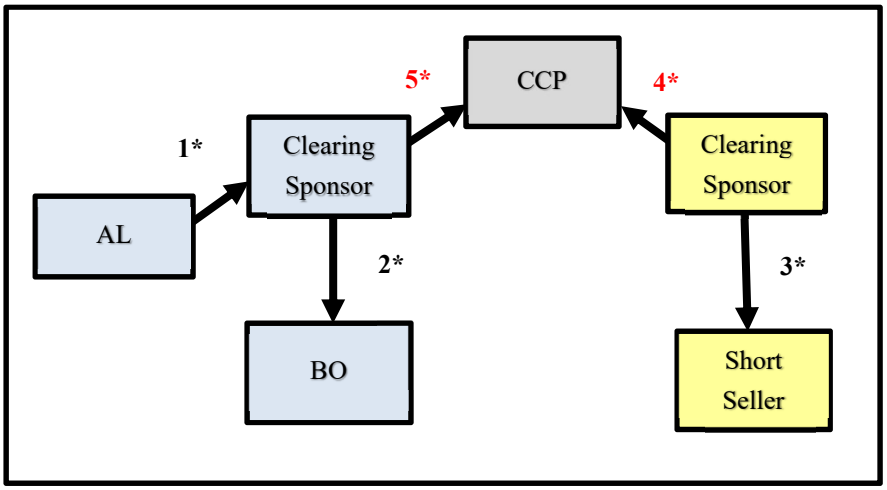
value of the stock by a percentage amount equal to the haircut stipulated under the supervisory haircut approach. The haircut associated with cash is zero.

287. Dr. Hendershott applies the CHA to the exposures clearing sponsors (including the Prime Broker Defendants) would face from stock lending in the but-for world. He estimates that the resulting regulatory capital costs would range from [redacted] and [redacted][299] Dr. Hendershott does not discuss the capital costs the Prime Broker Defendants incurred in the OTC stock loan market. However, in the actual world, Prime Broker Defendants would have the same bilateral exposures to borrowers and lenders that Dr. Hendershott estimates they do in but-for world as clearing sponsors. Comparing the exposures that give rise to capital costs in a sponsored clearing model with those incurred from an OTC stock loan highlights the implausibility of Dr. Hendershott's estimates.

288. A stock loan transacted on a platform and cleared through a CCP using a sponsored clearing model—which creates counterparty credit exposures in the but-for world—involves five counterparty exposures.[300] These five exposures are depicted in paragraph 4 of Appendix C in Dr. Hendershott's report. We refer to these same five exposures in our discussion of regulatory capital costs. We have reproduced Dr. Hendershott's diagram below in **Exhibit III.6,** shading "supply-side" counterparties, which we refer to as "Level 1," in blue and shading the "retail" or "demand-side" counterparties, "Level 2," in light yellow. We made no material changes to the diagram.

[299] Hendershott Report, ¶ 211; *see also*, *id*. ¶¶ 216-229 and Appendix C.
[300] Only regulated entities are required to maintain minimum capital requirements under the relevant regulations.

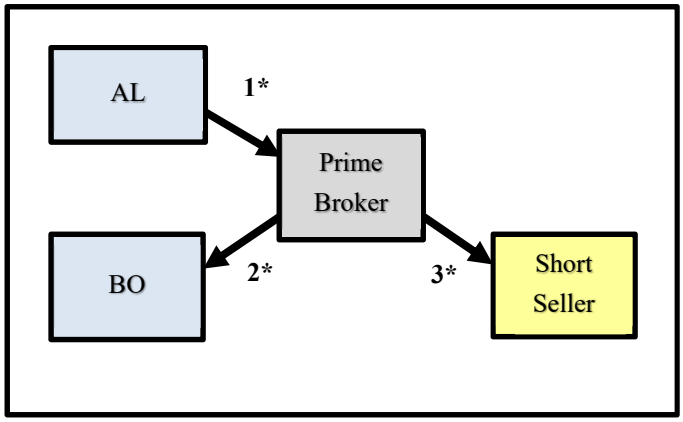
EXHIBIT III.6 CREDIT EXPOSURES:
CLEARED TRADE USING SPONSORSHIP MODEL



289. Agent lenders that indemnify beneficial owners (1*) are exposed to the risk that the security will not be returned in both an OTC trade and a trade conducted via sponsored clearing.[301] Similarly, just as clearing sponsor(s) face default risk from the beneficial owner (*2) and end user (*3) when stock loans are transacted on a platform using a sponsored clearing model, prime brokers face the same default risks from the beneficial owner and end-user borrower in the actual world. The only difference is that two *different* clearing sponsors could potentially face default risk when the loan is conducted on a platform (one from the end-user and another from the beneficial owner), whereas a single prime broker faces default risk from *both* the beneficial owner and short seller in the actual world. The diagram below depicts the counterparty credit exposures in an OTC stock loan trade.

[301] Hendershott Report, Appendix C, ¶ 5.

EXHIBIT III.7
CREDIT EXPOSURES: OTC STOCK LOAN



290. Comparing **Exhibit III.7** with Exhibit III.6, one can see that the exposures and capital costs of a clearing sponsor from platform trading in the but-for world differ from those of a prime broker in the OTC world *only* with respect to the additional exposure clearing sponsors would have to the CCP (*4 and *5) in the but-for world. These "new" exposures would not materially add to regulatory capital costs. Even if we accept Dr. Hendershott's calculations of these new exposures, these costs would be [redacted][302]

291. While we disagree with Dr. Hendershott regarding the precise regulatory provisions applicable in certain instances, as discussed later in this section, we agree that prime brokers face the default risk of beneficial owners and short sellers in both environments. An agent lender providing indemnification will face the default risk that some party will not reconvey the securities back to the beneficial owner. There is no reason to believe these regulatory capital costs would be higher in the but-for world in which CCPs are between lenders and borrowers to reduce the risks borne by each side than the actual OTC world. To the contrary, the Basel III reforms sought to reduce capital requirements from credit exposures involving a CCP.[303] As discussed above, Dr. Hendershott's analysis implies that Prime Brokers in the actual world would lose money on many transactions, because of the capital costs he calculated on these exposures.

[302] Hendershott Report, Appendix C, ¶¶ 17, 19.
[303] *See* Basel Committee on Banking Supervision reforms - Basel III, Pillar 1, available at https://www.bis.org/bcbs/basel3/b3summarytable.pdf.

292. One fundamental mistake Dr. Hendershott makes is to assume the capital requirements of a prime broker are incurred on a loan-by-loan basis, with the sum of the costs of those requirements being passed along to the client—here, either a beneficial owner or end-user borrower (i.e., a short seller). Dr. Hendershott's premise regarding capital requirements is incorrect. While it is fair to say that banks' minimum capital requirements *account for* each individual stock loan, it is not appropriate to "assess" the capital requirements of any individual stock loan as a "cost." The capital requirements of a collection of transactions can be significantly less than the sum of their individual capital requirements, to the extent that these transactions create offsetting exposures that can be netted by the prime broker. For example, in 2014, Finadium found that netting offsets reduced repo balance sheet impacts by up to 80%.[304] The same benefits apply to stock lending transactions, where "[p]rime brokers have possibly the best of all worlds when it comes to netting."[305] These benefits accrue as a matter of course, because "[p]rime brokerage agreements are typically legally enforceable netting agreements that allow for collapsing exposures down to a single receivable or payable balance."[306] In colloquial terms, prime brokers have one capital cost, aggregated across all clients and transactions, not millions of capital costs, accrued without offsets on individual trades. Dr. Hendershott's attempt to inflate these costs by conceptualizing each trade as a disconnected transaction is flawed and misguided.

293. There are numerous problems with Dr. Hendershott's conceptually flawed model, including that his analysis (1) misreads or misapplies the relevant regulations and rules and (2) does not conform to actual-world market practice. **Exhibit III.8** below duplicates Dr. Hendershott's summary table applying the CHA to the clearing members' four exposures, adjusting his analysis to reflect *actual market practices* and rational behavior in the but-for world, and correcting for his application of the wrong regulatory provision in two instances (changes identified in red). As explained in the following analysis of these exposures and depicted in **Exhibit III.8,** these adjustments eliminate clearing sponsors' exposures as to 2* and 3*, eliminating any exposure under the CHA and, in the case of exposures 4* and 5*, eliminating

[304] [redacted] at '424.
[305] *Id*. at '436.
[306] *Id*.

RWAs after applying the correct risk weight. In sum, what Dr. Hendershott calculates as one of the costliest expenses of platform trading is, in fact, zero cost.

EXHIBIT III.8
DR. HENDERSHOTT'S CLEARING SPONSOR EXPOSURES (CORRECTED)

Levels 1 and 2: New Exposures – Clearing Sponsors' Exposure to the Risk of CCP Default (*4 and *5)

294. Dr. Hendershott's first mistake is numerically small, but conceptually significant. Dr. Hendershott calculates the clearing sponsor's exposure to the CCP at [redacted] and [redacted] for

[307] As described herein, this represents $100 of stock borrowed by the clearing sponsor for purposes of loaning that stock to the CCP, plus an additional pledge of $19 of stock to the clearing sponsor.
[308] Our figures differ from Dr. Zhu's as a result of the applicable haircut. Again, we agree that the haircut applied by Dr. Hendershott is incorrect as to *both* the equity received and the equity collateral. But, for simplicity, we use Dr. Hendershott's haircut for all aspects of this exposure.
[309] For purposes of this computation, we adopt Dr. Hendershott's use of supervisory haircuts for illustrative purposes without accepting that these haircuts necessarily reflect the exposure calculations the Prime Broker Defendants used in the actual world, or would necessarily use in the but-for world. We agree with Dr. Zhu that this assumption is flawed. *See,* Zhu Reply Report, § II.B.1.b.
[310] As discussed below, a loan collateralized partially with cash and partially with equity is also possible, for instance, if the loan is collateralized with the proceeds of a short sale. This changes the formula, but not the result.

Levels 1 and 2 respectively.[311] This is incorrect under the relevant regulations. Dr. Hendershott incorrectly applied a 2% risk weight to the clearing sponsors' exposures to a CCP (depicted as exposures *4 and *5 in Exhibit III.6 above and corresponding to the second and fourth column in the corrected Exhibit III.8).[312] However, the relevant regulations,[313] as well as Defendants' own interpretation of those regulations,[314] apply a 0% risk weight to these exposures. Using the correct risk weight results in zero RWAs, and consequentially, zero capital costs from the clearing sponsors' transactions with CCPs. Accordingly, the only credit exposures which could give rise to capital costs for a prime broker exist in both the actual OTC market and the but-for world when the prime broker acts as a sponsor. Stated another way, the capital costs of a prime broker as a clearing sponsor in the but-for world should be, at worst, the same as its capital costs in the OTC market, if not better due to netting benefits.[315] This is fully consistent with Basel III and the Federal Reserve Board's implementation of Basel III, which were both specifically designed to incentivize central clearing.

Level 2: Clearing Sponsor/Prime Broker's Exposure to the Risk of End-User, Short Seller Default (3*)

295. Dr. Hendershott calculates the clearing sponsor's exposure to a short seller as [redacted][316] resulting in capital costs of [redacted][317] This ignores real-world mechanisms that Prime Brokers use to reduce their balance sheet footprint—and thus their capital costs—to zero. The primary method is overcollateralization.

296. When a prime broker lends a stock to a short seller, the prime broker must collateralize the loan. The collateral can come from the proceeds of the direct sale of the stock

[311] Hendershott Report, Appendix C, ¶10.
[312] Hendershott Report, Appendix C, ¶10.
[313] 12 C.F.R. § 217.35(c)(3) (providing that a clearing member may apply a zero percent risk weigh to the trade exposure amount cleared through a CCP when that transaction offsets another transaction that satisfies the requirements set forth in 12 C.F.R. § 217.35(a) and the clearing member is not obligated to reimburse its client in the event of the CCP default).
[314] *See* [redacted] at '499 ([redacted]).
[315] *See, e.g.*, [redacted]
[316] Hendershott Report, Appendix C, ¶10.
[317] Hendershott Report, Appendix C, ¶19.

or the other assets that the short seller has on deposit with the prime broker. Dr. Hendershott acknowledges that short sellers may not have cash on hand to cover the extent of collateralization needed.[318] A short seller's assets, including its fully paid long positions, are typically kept in margin accounts.[319] These assets can be used to overcollateralize the loan at Level 2, completely negating the prime broker or clearing sponsor's exposure. As a presentation from [redacted] succinctly put it, "[redacted]"[320] Prime brokers set margin requirements for their clients that reflect those clients' risk profile and trading history.[321] Prime brokers use client margin to reduce their credit exposures and attendant capital requirements, by requiring sufficient assets to overcollateralize all loans.[322]

[318] Hendershott Report, ¶¶230-231 (alleging that, to finance margin, short sellers will need to borrow cash).
[319] Hendershott Report, ¶31 n.33.
[320] [redacted] at '847; *see also*, *e.g.*, [redacted] at '233 (explaining that one of several measures used to mitigate capital impacts, [redacted] had used "[redacted]" in which it [redacted]).
[321] [redacted] at '005 ([redacted] explaining that "[redacted]"); [redacted] at '118 ([redacted] [redacted] at '245 ([redacted] explaining that the "[redacted]"); [redacted] at '722 (discussing [redacted]); [redacted] at '175 ([redacted] explaining that, with regard to its "[redacted]").

297. Applying overcollateralization to Dr. Hendershott's stylized example of a stock loan, we assume, as he does, that a prime broker lends stocks valued at $100 to the short seller but, instead of receiving $102 of collateral, the short seller provides [redacted] of collateral. We compute the value of [redacted] under the conservative assumption that collateralization is all long equity, and using Dr. Hendershott's haircut. In this case, to calculate the margin required to overcollateralize a given exposure, one must know: (1) the value of the stock borrowed and (2) the effective haircut. Assuming an effective haircut of [redacted][323] one would need [redacted] Under the CHA, the prime broker's exposure from this transaction would be [redacted]

298. The assumption that equity is used for collateral is conservative because we would expect the cash proceeds from the short sale to be used as collateral. Using cash proceeds from the short sale would significantly reduce the extent of overcollateralization required. A stock loan made to a short seller at Level 2 generates cash collateral as soon as the stock is sold. The proceeds of the short sale would equal the value of the stock, and the prime broker who executes the short sale can simply use the proceeds as cash collateral for the loan. In this case, the short-seller client only needs to come up with the overcollateralization in the form of equity. With cash collateral of $100 on a stock loan of $100, the prime broker's exposure is only [redacted] To cover this remaining exposure with equity, the prime broker needs to hold only [redacted] of the client's long equity positions as extra collateral, since [redacted] The prime broker has achieved full protection, i.e., zero exposure, by holding collateral worth [redacted] As a result, using cash proceeds for collateral reduces the total amount of overcollateralization needed. Other ways to reduce the amount of collateralization needed include posting main-index equity, which would have a lower haircut than the [redacted] haircut that Dr. Hendershott assumes.

299. Overcollateralization eliminates the prime broker's or clearing sponsor's capital costs. The Basel Committee on Banking Supervision explains this logic using derivatives as an example:

> over-collateralisation should reduce capital requirements for counterparty credit risk. In fact, many banks hold excess collateral (ie collateral greater than

[323] We are conservatively assuming Dr. Hendershott's figure for the appropriate haircut without endorsing its value.

> the net market value of the derivatives contracts) precisely to offset potential increases in exposure represented by the add-on. . . . [C]ollateral may reduce the replacement cost component of the exposure [under the relevant provisions.][324]

300. [redacted][325][redacted][326]

301. The cost of overcollateralizing transactions in this fashion is the opportunity cost of being unable to lend or rehypothecate the assets used for overcollateralization. But, as Dr. Hendershott acknowledges, most stock is general collateral, which is largely unlent.[327] This asset, among others, has virtually no opportunity cost associated with using it as additional collateral.

302. Dr. Hendershott's analysis makes no mention of the role of overcollateralization in calculating capital requirements. Nor does he provide any support for the proposition that market participants (or regulators) approach the calculation of exposures as he does in arriving at his estimates of capital costs. Prime brokers' credit exposures to their short-seller clients arising from stock loans transacted OTC are no different than prime brokers' credit exposures for these same loans transacted on a platform with central clearing. Accordingly, it is our opinion that rational market participants would apply the same overcollateralization approach when transacting on a platform, resulting in $0 capital requirements from this exposure and therefore $0 capital costs.[328]

Level 1: Clearing Sponsor's Exposure to the Risk of Beneficial Owner Default (*2)

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[324] See https://www.bis.org/basel_framework/chapter/CRE/52.htm at 52.12; *see also id*. at 52.13-14 (explaining how existence of margin agreements alters the exposure amount calculation under the standardized approach).
[325] [redacted] at '960.
[326] [redacted] at '004'007 (explaining that [redacted]).
[327] Hendershott Report, ¶37 (GC utilization rates are roughly 10%).
[328] $0 RWA x Capital Ratio x Capital Costs = $0.

303. Dr. Hendershott calculates the clearing sponsor's exposure to a beneficial owner as [redacted][329] As with his analysis of the short seller exposure, Dr. Hendershott assumes that clearing sponsors would do nothing to mitigate this exposure to beneficial owners in the but-for world. This is economically irrational for clearing sponsors with capital requirements, such as the Prime Broker Defendants. Level 1 clearing sponsors could and would protect against the risk of their beneficial owner clients' default by requiring that their clients pledge additional collateral, above the value of the stock loan. This would effectively "overcollateralize" Level 1 clearing sponsors, eliminating their need to maintain regulatory capital to cover the exposure.

304. To calculate the requisite amount of pledge collateral necessary to account for the level one clearing sponsor's risk and related capital requirements, one must know: (1) the value of the stock on loan, (2) the amount of collateral provided in exchange for the loaned stock, and (3) the effective haircut. Assuming a loan of $100 of stock with an expected receipt of [redacted] cash collateral, a Level 1 clearing sponsor would require an additional pledge of [redacted] o cover its risk.[330] Applying the CHA to these assumptions yields an exposure amount of $0.[331]

305. In the current OTC market, [redacted][332] To the extent agent lenders were clearing members capable of sponsoring their clients' access to the CCP in the but-for world, the agent lender-clearing sponsor would be automatically overcollateralized with this provision. If a beneficial owner were to use a clearing sponsor other than their agent lender, they need only place the requisite amount of general collateral in a bankruptcy remote, ring-fenced account for their clearing sponsor to achieve the same result. As we indicated, there is no opportunity cost to

[329] Hendershott Report, Appendix C, ¶ 10.

[330] [redacted]

[331] [redacted]

[332] *See* [redacted] at '280 (stating that [redacted]); [redacted] at '589 (providing that [redacted] as the agent lender has [redacted]"); [redacted] at '391 (granting [redacted] as the agent lender a "[redacted]").

using general collateral in this way as beneficial owners typically have no alternative use for most holdings of these stocks.

306. A second way that capital costs would be lower than what Dr. Hendershott claims is through a special CCP-membership model. In such a model, beneficial owners would be allowed to transact stock loans directly on a platform and to enter into clearing transactions directly with the CCP, as opposed to requiring the intermediation of a clearing sponsor. This would eliminate all sponsorship costs related to Level 1 regulatory capital requirements. Under this model, the clearing sponsor at Level 1 is eliminated. As long as the beneficial owner is not a Board-regulated financial institution, subject to regulatory capital requirements, the capital cost associated with this exposure is eliminated. Special membership programs under consideration by the [redacted] and [redacted][333]

307. Dr. Hendershott dismisses the possibility of a special membership in the U.S. stock lending but-for world as "speculative."[334] It is our understanding that [redacted][335] as did key market participants. This included some of the Prime Broker Defendants who [redacted][336] [redacted][337] Thus, special memberships are plausible from a risk management or regulatory perspective.

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[333] *See* [redacted] (explaining that the special membership model "[redacted]"); [redacted] at '471 ([redacted] presentation describing their special membership model in which "[redacted]").

[334] Hendershott Report, ¶ 224.

[335] *See* [redacted])

[336] [redacted] Ex. 1514 ([redacted]), at '531 (laying out the core principals of [redacted] which included ensuring that, "[redacted]" and explaining that the "[redacted]").

[337] *See* [redacted] Ex. PX2305 ([redacted]), at '832 ([redacted]

308. Dr. Hendershott is correct that the [redacted] would have needed to obtain SEC approval before moving forward with the special membership program. But the SEC's standards for clearing agencies, which were mandated by Dodd-Frank, not only allow beneficial owners to trade directly with a CCP, they *require* that entities like beneficial owners be allowed to transact directly with the CCP.[338] Notably, the [redacted] [redacted][339] suggesting that regulatory approval would have been possible absent a conspiracy.

2. CCP-Related Costs Would Not Have Exceeded [redacted]

309. There are two relevant CCP-related costs Dr. Hendershott proposes: default fund contribution costs and the cost of posting initial margin. We accept Dr. Hendershott's estimate for the capital costs of contributing to the CCP's default fund—[redacted]—for the purpose of this exercise.[340] We note, however, that this estimate is conservative as to beneficial owners; had the market adopted a special CCP membership for agent lenders, as we believe it would have, that model would have omitted any requirement that beneficial owners contribute to the default fund[341] in line with [redacted] and [redacted] special memberships.[342]

[redacted]); [redacted] (summarizing a meeting of the [redacted] and noting that [redacted]").

[338] *See* § 240.17Ad-22 (Standards for clearing agencies provide that, "…(b) A registered clearing agency that performs central counterparty services shall establish, implement, maintain and enforce written policies and procedures reasonably designed to: … (5) Provide the opportunity for a person that does not perform any dealer or security-based swap dealer services to obtain membership on fair and reasonable terms at the clearing agency to clear securities for itself or on behalf of other persons.").

[339] DTCC, Securities Financing Transactions (SFT) Clearing Service, available at https://www.dtcc.com/-/media/Files/Downloads/Clearing-Services/SFT-Clearing-Service-Fact-Sheet.pdf; *see also* Fennell Tr. 76:1-8 (affirming that the OCC continued to evaluate the special membership allowing direct clearing access).

[340] *See* Hendershott Report, Exhibit 16.

[341] [redacted] Ex. PX2305 ([redacted]), at '832 ([redacted] presentation from 2016 explaining that "[redacted]") (emphasis in original); [redacted] at '920 (noting in an email summary of a meeting of the [redacted] that the special membership under consideration "[redacted]").

[342] Exhibit 207 ([redacted] "[redacted]); [redacted] ([redacted]"); [redacted] at Slide 4

310. Turning to the cost of posting initial margin, Dr. Hendershott calculates this cost to be up to [redacted][343] This figure is a gross overstatement. Two main errors underpin his conclusion: (1) he wrongly disregards market participants' ability to earn an investment return on margin posted with the CCP when, in actuality, margin posted with CCPs is often invested in Federal Reserve accounts;[344] and (2) his analysis ignores OCC Rules expressly allowing parties to satisfy their margin requirements using equities, obviating any need to borrow funds to satisfy margin requirements. Correcting for these flaws [redacted] These estimates are conservative as they do not incorporate potential benefits of cross-CCP netting.[345]

Dr. Hendershott's Margin Cost Methodology Is Deeply Flawed

311. CCPs require that most participants post margin as one means of mitigating the risk of counterparty default. The OCC uses a large-scale, Monte Carlo-based approach known as the STANS methodology to assess participants' margin requirements.[346] Entities needing to borrow funds to satisfy their margin requirement would incur a cost for doing so in the form of the financing rate. Dr. Hendershott assumes that all beneficial owners and short sellers would need to borrow funds, equating the cost of posting initial margin with the cost of borrowing that margin. He calculates margin costs as:

[Dr. Hendershott] margin costs = margin financing rate * margin requirement

312. As described more fully below, this assumption is incorrect since the CCP pays a return on the margin posted. That is, beneficial owners obtain an investment return from the CCP on the cash they post to satisfy this requirement.[347] We call this investment return the CCP

(explaining in a 2015 powerpoint presentation entitled, "[redacted]" that under the [redacted].

[343] Hendershott Report, Section IV & Exhibit 16.I

[344] Often these investments earn higher returns than low-risk alternatives. *See* Zhu Reply, Section III.B.2.

[345] *See* https://www.theocc.com/Risk-Management/Cross-Margin-Programs.

[346] https://www.theocc.com/Risk-Management/Margin-Methodology. Other CCPs use similar methodologies. *See, e.g.*, National Securities Clearing Corporation (NSCC) Rules and Procedures, available at https://www.dtcc.com/~/media/Files/Downloads/legal/rules/nscc_rules.pdf. A margin requirement is a percentage of the transaction value that must be posted, in some form, to the CCP in order to cover its default risk with respect to that transaction.

[347] Often these investments earn higher returns than low-risk alternatives. For instance, the CME paid interest on excess reserves (IOER) throughout the class period, and today pays interest on reserve balances (IORB). *See*

investment rate. Therefore, a more accurate measure of costs would be the cost of borrowing the necessary funds minus the amount earned on the margin invested with the CCP or the (margin financing rate * margin requirement) – (CCP investment rate * margin requirement). Another way to express this same principle would be to calculate the difference (or spread) between the margin financing rate and the CCP investment rate and multiply that spread by the margin requirement. As such, for those entities needing to borrow money to post margin, the correct calculation of their costs would be:

[Corrected] margin cost = (margin financing rate – CCP investment rate) * margin requirement

313. For those entities able to satisfy their margin requirements without borrowing money, their margin costs would be the opportunity cost from having used their funds or collateral as margin instead of for some other purpose. In some cases, this "cost" could even be negative, i.e., the margin poster will earn a higher return by posting margin than they would investing in the open market, since the interest rate on margin accounts can be higher than the going benchmark rate, as we explain below.

314. Moreover, Dr. Hendershott applies the same margin financing rate to beneficial owners as he does to short sellers. This approach does not make economic sense. Beneficial owners are typically more credit-worthy than short sellers. Dr. Hendershott's high-end margin cost scenario, for instance, applies a financing rate supposedly offered to named plaintiff Torus, a short-seller, to all beneficial owners.[348] Dr. Hendershott provides no basis for using the same margin financing rate for both the lender and the borrower. This assumption goes unexplained in his report.

Level 1: Beneficial Owners Would Incur No Margin Costs.

315. Beneficial owners would incur no margin costs under a CCP under three scenarios.

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https://www.cmegroup.com/clearing/financial-and-collateral-management/files/interest-pass-through-rate-faq.pdf; *see also* https://fred.stlouisfed.org/series/IOER#:~:text=Starting%20July%2029%2C%202021%2C%20the,on%20reserve%20balances%20(IORB). The interest rate on IOER and IORB exceeds the interest rate on comparable short term, low risk investments, as discussed more fully *infra*.

[348] Hendershott Report, Exhibit 16.I.D.

316. First, since the [redacted] does not require margin to be posted in the form of cash, beneficial owners with excess unlent securities could use those securities to satisfy margin requirements. [redacted] expressly states that the [redacted] accepts equities as margin collateral.[349] As beneficial owners typically possess substantial amounts of unlent general collateral[350] which, by definition, are in plentiful supply and present minimal opportunity for incremental earnings, the opportunity costs of posting these assets as margin is $0. Though one of Dr. Hendershott's own sources acknowledges the ability of beneficial owners to forego financing their margin requirement by posting unlent securities,[351] neither Dr. Hendershott[352] nor Defendants' other experts[353] even reference the possibility, rendering their conclusions regarding the magnitude of these costs specious.

317. Second, if a beneficial owner satisfies its margin requirement using cash, the margin costs could have been negative, as Dr. Zhu's reply report describes in detail.[354] In other words, beneficial owners could have made money had they chosen to use cash to satisfy their margin requirement. Beneficial owners typically invested their cash in low-risk/low-return instruments

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[349] *Id*. We note that [redacted] permits the posting of certain fixed income instruments as well, such as Treasury bonds. Beneficial owners could likewise post these to satisfy their margin requirements.

[350] *See* Hendershott Report, ¶231 (explaining that "[redacted]").

[351] [redacted] at '440 ("[redacted]") (cited at Hendershott Report, ¶ 231).

[352] Dr. Hendershott apparently assumed, incorrectly, that the [redacted] would not accept equities as margin collateral. *See* Hendershott Tr. 120:13-121:15 ("[redacted]").

[353] Mr. Pridmore acknowledged that [redacted] *See* Pridmore Tr. 363:4-16 ([redacted]"); *Id.* at 364:8-21 ("[redacted]"); *Id.* at 364:22-24 ("[redacted]").

[354] *See* Zhu Reply Report, Section III.B.2.

such as Treasury Bills.[355] However, cash used to satisfy CCP margin requirements earns the Interest Rate of Excess Reserves or Interest on Reserve Balances (IOER/IORB).[356] Accounts with this type of return are reserved exclusively for certain entities,[357] including the [redacted][358] Since the IOER return[359] exceeded the return from Treasury Bills throughout the Class Period,[360] beneficial owners choosing to use their cash to satisfy a CCP's margin requirement would have done *better* than they would have had they invested in Treasury Bills.

318. Third, [redacted][361] As we discussed above, we believe it was likely the market would have adopted such a special membership program for agent lenders.

319. Thus, under each of these three scenarios, the costs to beneficial owners of posting initial margin with the CCP would be $0.

Level 2: Short Sellers' Margin Costs Would Not Exceed 5 bps.

320. Like Dr. Hendershott, we assume for purposes of our cost analysis that short sellers would need to borrow cash from their clearing sponsor to satisfy their CCP-margin requirement.

321. To determine the margin cost associated with the Level 2 side of the transaction, we must determine the appropriate margin requirement and margin financing spread. We estimate

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[355] Beneficial owners, as a generally matter, do not engage in high risk cash investment opportunities, as this type of investing has led to substantial losses. *See, e.g.*, "What Went Wrong at AIG?", available at https://insight.kellogg.northwestern.edu/article/what-went-wrong-at-aig (discussing how risky cash reinvestment opportunities led to the collapse of AIG).

[356] *See* https://www.cmegroup.com/clearing/financial-and-collateral-management/files/interest-pass-through-rate-faq.pdf; *see also* https://fred.stlouisfed.org/series/IOER#:~:text=Starting%20July%2029%2C%202021%2C%20the,on%20reserve%20balances%20(IORB).

[357] *See* https://home.treasury.gov/system/files/261/here.pdf.

[358] *Id*.

[359] *See* https://www.cmegroup.com/clearing/financial-and-collateral-management/files/interest-pass-through-rate-faq.pdf. In a competitive environment, we expect that the OCC would remit investment returns on margin accounts just as the CME does. Competition on rates—including margin efficiency—would ensure that CCPs remit these investment gains.

[360] *See* Zhu Reply Report, Section III.B.2.

[361] *See* [redacted] Ex. PX2510 ([redacted]) at '215 (stating that, [redacted]"); Exhibit 207 (explaining that [redacted]).

the margin requirement to be 10%.[362] This figure is consistent with industry practice,[363] material in the discovery record,[364] and Dr. Hendershott's own analysis.[365]

322. Financing rates differ according to the creditworthiness of the borrower.[366] Relying on the analysis in Dr.. Zhu's report, we use a range of 20 bps to 50 bps as a reasonable estimate of the margin financing rate.[367]

323. Multiplying the margin financing rate and the 10% margin requirement results in margin costs of 2 bps for the most creditworthy borrowers (20 bps x 10%) and 5 bps for the least creditworthy borrowers (50 bps x 10%). These calculations are perfectly in line with two of Dr. Hendershott's own exemplar scenarios,[368] though we note that in both scenarios Dr. Hendershott fails to use the appropriate margin financing *spread*.

324. Dr. Hendershott's higher-end margin-cost estimates—the scenarios presented in Exhibit 16.I.C and 16.I.D—lack credibility for several reasons. Both scenarios fail to account for the appropriate credit spread, calculating only the cost of borrowing the funds. Thus, even if one were to believe the financing rates and margin requirements provided in his example are reasonable—we do not—his cost calculation still fails because it does not account for the return earned from investing the borrowed margin with the CCP. Additionally, Dr. Hendershott's reliance on financing rates drawn, apparently at random, lacks credibility. He offers no evidence that these rates were ever paid by short sellers, nor does he explain why he believes these rates to be reflective of those that would exist in the but-for world. Moreover, Dr. Hendershott provides no reason for believing that [redacted] in Exhibit 16 Row 1.D labelled "[redacted]" was actually paid by anyone. Such a high margin requirement would assume an implausibly high degree of volatility. Dr. Hendershott then applies this [redacted] margin requirement to *named plaintiff Torus'* (a borrower)

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[362] The [redacted] STANS methodology would have calculated margin requirements at the portfolio level, assessing risk of all trading activity in a portfolio. Stock loans can offset risks from other transactions such as options and derivatives, which could greatly reduce one's margin requirement.
[363] *See* [redacted] at '643.
[364] *See* [redacted] at '440 ([redacted]).
[365] *See* Hendershott Report, Exhibit 16 n.1 ([redacted]). It likewise conforms with Dr. Zhu's analysis. *See* Zhu Reply Report, Section III.B.2.a.
[366] *See* Zhu Reply Report, Section III.B.2.
[367] *Id*.
[368] *See* Hendershott Exhibit 16.I.A ([redacted]); Hendershott Exhibit 16.I.B ([redacted]).

financing rate. He provides no basis for this match. Finally, as mentioned above, this same rate is applied to both beneficial owner and short seller sides in Exhibit 16. There is no reason to expect beneficial owners to have the same [redacted] margin cost as short sellers.

325. In light of these errors, Dr. Hendershott's margin cost estimates lack credibility. He has merely selected worst-case scenarios—without verifying whether they occur in the actual world. Even if there were some short sellers who had high margin financing rates, these short sellers could continue to transact OTC, since our but-for world is a world of choice.

3. Our Methodology for Estimating Platform Fees is Sound.

326. Two forms of platform fees exist: transaction fees and subscription (sometimes referred to as "fixed") fees. Dr. Hendershott largely accepts our use of AQS's transaction fees, noting only that these fees would have been lower for some class members due to volume discounts.[369] This fact only highlights the extent to which our damages model is conservative.

327. As to fixed fees, Dr. Hendershott opines that these fees would have been [redacted] amounting to [redacted][370] This is not true. For smaller Level 1 lenders, any fixed access fees would have been paid by agent lenders in most instances—not by beneficial owners—because it is only the agent lender who would need access to the platform. This would have dramatically reduced, if not eliminated, the extent to which beneficial owners paid fixed platform fees. Similarly, smaller short sellers that did not seek direct platform access could have had their clearing sponsor connect to the platform to execute any trades, spreading any fixed fees or infrastructure costs among all the short sellers having their clearing sponsor serve in this capacity. Moreover, information on trading prices on the platform would have been widely available for free in a but-for world, much like in public stock markets.

328. Additionally, a competitive market would have driven down subscription fees for lenders and borrowers. For example, evidence suggests that [redacted]

[369] Hendershott Report, ¶¶ 256-257.
[370] *Id.* ¶ 261.

[redacted][371] and [redacted][372] Had another platform entered the market to compete with AQS, as SL-x sought to do, there would have been additional pressure on these types of subscription fees. This pattern has occurred in platforms for other financial instruments, including equities. As [redacted] explained in a presentation to the SEC, [redacted][373]

329. Dr. Hendershott disagrees with our conclusion that competition in the but-for world would have reduced platform fees, in part because he says there would have been "high up-front and ongoing operational costs of accessing each new platform."[374] Dr. Hendershott fails to describe the magnitude of these up-front and ongoing operational costs. As the use of a platform is more efficient than an OTC market, long-term operational costs would be lower than in the current OTC market. Furthermore, as to the Level 1 side of the market, the Defendants' own industry expert, William Pridmore, testified that [redacted][375]

[371] *See* [redacted] (January 2012 notice to [redacted] members explaining that the [redacted] and explaining that "[redacted]"); [redacted] ([redacted]; [redacted] at [redacted]–'215 ([redacted]); [redacted] ([redacted]).

[372] *See* [redacted] (explaining in a spreadsheet with [redacted] own notes that [redacted] stating, for example that the annual subscription "[redacted]" for [redacted] and it was billed only for "[redacted]" noting that there would be "[redacted]" for [redacted] and [redacted] *see also* [redacted] ([redacted] from September 12, 2016 showing [redacted]; [redacted] ([redacted] from December 28, 2017 showing [redacted] reflecting that [redacted]).

[373] [redacted] at '668; *see also id.* at '669 ([redacted]").

[374] Hendershott Report, ¶ 264.

[375] Pridmore Tr. 296:4-9 ([redacted]")

330. Dr. Hendershott relies on [redacted] declaration for the proposition that [redacted][376] [redacted] declaration [redacted][377] But there is record evidence that, at least in some instances, [redacted][378] suggesting that AQS could have negotiated better prices for these services. Moreover, as AQS or a similar platform grew, it could have created its own systems for handling services provided by vendors such as accounting and settlement processing, eliminating the costs associated with paying vendors for those services. [redacted][379] Finally, [redacted] has testified that AQS's intent was to "[redacted]" and so the company had a plan "[redacted]"[380] One aspect of that strategy was to move toward reduced reliance on fixed fees and increasing revenue from maintenance fees on large volumes of transactions. [redacted] emphasizes that "[redacted]"[381]

331. For these three reasons—(1) sponsors could pay for platform access fees and spread those costs among many beneficial owners and short sellers; (2) platforms have a strong

[376] Hendershott Report, ¶ 262.
[377] [redacted] Declaration, ¶ 11.
[378] *See* [redacted] (January 6, 2012 email from [redacted] to [redacted] and [redacted] of [redacted] explaining that [redacted]; [redacted] (internal [redacted] email also explaining that [redacted] invoice would reflect that "[redacted]" and then "[redacted]"); [redacted] (email from [redacted] to [redacted] regarding [redacted] stating, "[redacted]") (capitalization in the original).
[379] *See* [redacted] at slide 6 (explaining that [redacted] "[redacted]" with [redacted]); [redacted] (describing [redacted]).
[380] [redacted] Decl. ¶ 5.
[381] [redacted] Decl. ¶ 15.

incentive to subsidize participation and AQS and Equilend did so; and (3) competitive forces would have driven down subscription fees (and likely transaction fees)—our decision to omit fixed subscription fees from our model was sound.

4. Final Estimates of Sponsorship and Platform Costs

332. When corrected, we find that Dr. Hendershott's analysis overestimates the total cost of sponsorship by up to [redacted] This includes the [redacted] and [redacted] Dr. Hendershott's Exhibit 16 calculates the "[redacted]" as [redacted] and [redacted] Above, we calculate the same fees as [redacted] and [redacted] Adding [redacted] we reach our conservative estimate of the cost of sponsorship: [redacted] and [redacted] This is depicted in Exhibit III.5. As in our Opening Report, we set sponsorship fees equal to sponsorship costs because we expect a competitive market for sponsorship to emerge in the but-for world. Since sponsorship fees are not the same for Beneficial Owners and Short Sellers, in conservatively responding to Dr. Hendershott's critique, we now define $F_{s,bo}$ and $F_{s,ss}$ to represent sponsorship fees for Beneficial Owners and Short Sellers, respectively.

333. As in our Opening Report, for sponsored users of the platform, sponsorship fees would cover the initial margin and default fund costs required to transact on a CCP via sponsored access. A market participant who does not require sponsored access would directly pay for the initial margin and default fund costs—an amount that is no greater than these sponsorship fees. (If the amount were in fact greater, there would be no reason for this participant to trade directly with the platform and without a sponsor). Therefore, in computing damages, it is conservative to assume that all trades were sponsored. As a result, $F_{s,bo}$ is subtracted from the platform price for Beneficial Owners and $F_{s,ss}$ is added to the platform price for short sellers, even if they do not require sponsored access. In this section, we explain further why the approach taken in our Opening Report is sound.

334. Our Opening Report reasoned that the sponsorship fees would be low due to (1) competition among Clearing Members to serve as sponsors and (2) benefits afforded to market

participants transacting with a CCP,[382] which market participants believed could result in substantial cost savings.[383] We concluded that when the costs of cleared platform trading were weighed against the economic benefits arising from transacting with CCPs, the net sponsorship fee F_s would likely be negligible. The sponsorship fee Fs we have used in this report are conservative not just in how the costs of sponsorship are computed but in the fact that we disregard the economic value of the benefits realized by beneficial owners and short sellers from a central clearing. Given that F_s was likely to be negligible, we explained that F_s would be less than the incremental costs of trading OTC in the but-for world (F_{otc}).[384] Moreover, the capital costs associated with Prime brokers exposure to beneficial owners, or capital costs associated with Prime Brokers exposure to short sellers, would be, as our discussion above shows, zero.

335. Relying on a document prepared by one of the Prime Broker Defendants, [redacted] we estimated [redacted] as a conservative estimate of F_{otc}. As demonstrated in **Exhibit III.9** below, F_{otc} is well within the range of F_s.

EHXIBIT III.9
COMPARISON OF CONSERVATIVE F_s AND F_{otc} (BPS)

[redacted]

336. Defendants' Experts criticize our [redacted] estimate of F_{otc}, based largely on the fact that a [redacted] and drafted the presentation from which that estimate was sourced.[385] Having reviewed the presentation, [redacted][386] that we regard to be reasonable. Moreover, it is our understanding from the record evidence that [redacted]

[382] Opening Report, ¶ 272.
[383] *See* [redacted] at '488 ([redacted] referencing an [redacted] which "[redacted]"); [redacted] at '776 (explaining in a presentation discussing [redacted] "[redacted]").
[384] Opening Report, ¶¶ 287 and 494-495.
[385] *See generally*, Opening Report, Section XI.F.
[386] [redacted] at '196.

e [387] These same [388] [389] To our knowledge, had no reason to over- or under-estimate the costs of OTC trading in its own, internal presentation, nor can we think of a reason to believe relied on specious materials in deciding its business strategy, let alone shared something it regarded as unreliable with its competitors and clients.[390]

337. Our Opening Report also made additional points ignored by the Defendants' Experts about F_{otc}. In particular, the estimate of F_{otc} was also informed by the academic literature on off-platform trading of stock equities, which compares "upstairs trading" to downstairs on-exchange trading.[391] Therefore, we see no reason to revise our opinion that is a reasonable estimate of F_{otc} (i.e., the incremental costs of trading OTC in the but-for world).

338. Next, we address how these incremental OTC costs are treated when estimating the loan prices a class member would obtain if trading stock loans in the OTC market rather than on an electronic platform. As we noted in our Opening Report, our model was conservative in assuming that in the but-for world, prime brokers would be able to charge borrowers their but-for platform price plus F_{otc} (i.e.,) and pay lenders their but-for platform price minus F_{otc}. As we noted, the platform prices of lenders and borrowers incorporate the costs of platform trading F_p, a cost the prime broker would not have to incur. Therefore, by charging an incremental F_{otc} of

[387] *See* Ex. 1107 (June 2009 email from rwarding " " presentation to including June 2009 notes from meeting where discussed presentation); Ex. 507 (June 2009 email from to and including who " ").

[388] *Id.*; Ex. 1108 at '803 (July 2009 email from to " ").

[389] Ex. 4519 (March 2010 email from sharing presentation with employees).

[390] Defendants' experts also criticize our reliance on this presentation because, they maintain, its analysis was But they do not and cannot provide any reason for Moreover, as further support for Finally, the presentation was

[391] Opening Report, ¶ 493.

[redacted] while still trading at prices that incorporate F_p, the prime broker would capture the F_p as an incremental revenue with no associated costs, i.e. as a pure profit.[392]

339. Under our conservative adjustments to platform costs, the OTC price now incorporates even greater profit for prime brokers. As discussed above, the loan prices received by lenders and paid by borrowers on the platform will now be lower, and higher, respectively, by their conservatively assumed sponsorship costs of [redacted] and [redacted] These sponsorship costs consist of: (1) the cost of posting margin with the CCP, and (2) the costs associated with the CCP's default fund. Neither of these costs would be borne by a prime broker on an OTC trade. Therefore, by allowing the prime broker to receive a price based on the but-for world's platform price, our model is now providing the prime broker even greater incremental revenues than it received under our Opening Report model. Not only is the prime broker compensated for platform costs it does not have to bear, it is also now compensated for sponsorship costs it does not have to incur.

340. If prime brokers charge OTC loan prices equal to the sponsored platform prices obtained by lenders and borrowers, the additional revenue they will receive through the embedded sponsorship charge component ([redacted]) will more than cover the incremental OTC trading costs of doing a round-trip trade ([redacted]). Therefore, with the assumed higher sponsorship fees, prime brokers earn greater profits on their OTC trades than they did in our Opening Report model.

341. In summary, our model allows prime brokers to charge the same lending and borrowing prices as those prevailing in platform trading under the conservatively high sponsorship costs we have assumed for the but-for world. These prices entail a greater profit for prime brokers on a round-trip stock loan trade than the model of our Opening Report allowed.

IV. DAMAGES

342. Below we provide updated damage calculations for the Class Period through the date of our Opening Report, including damages for the Class and named-plaintiffs. In response to Defendants' Experts, and utilizing all six databases as they did, our damages incorporate a more conservative assumption for sponsorship fees as discussed in Section III.E. above. Our damages

[392] Opening Report, ¶ 488-89.

also incorporate the transactional data from [redacted] that Dr. McCrary utilized. Where applicable we also incorporate minor data construction issues raised by the Defendants' experts. These adjustments are reflected in datasets we call our Updated Prime Broker Transactions Datasets and Updated Pooled Prime Broker Dataset. We have also updated our [redacted]

343. As summarized in Section IV.B.1 below (**Exhibit IV.3**), our computation of class member damages for the period January 1, 2012, through the date of our Opening Report is [redacted] for the [redacted] and [redacted] for the [redacted] for a **total** of [redacted] As discussed below, these amounts reflect adjustments for weekends, unmatched transactions, missing [redacted] and an estimate for damages for the period January 1, 2018, to the date of our Opening Report. We performed these calculations to demonstrate our methodology for showing class damages is common and workable for purposes of class certification, but we reserve the option of updating our calculations through trial.

344. We demonstrate that even under the various conservative assumptions our model uses that very likely underestimates class members' true damages, virtually all accounts have transactions with positive damages. Of [redacted] there are [redacted] (representing [redacted]). Of the [redacted] there are [redacted] (representing [redacted]).[393] Of course, as discussed above and in Dr. Zhu's report, the entire class was negatively impacted by the conspiracy, and these damages figures are necessarily conservative. We recognize that defendants argue that a "net" as opposed to "gross" approach is legally required by the law when aggregating damages across stock loan transactions for a class member. Our model can easily be adjusted to calculate damages for each class member on either basis, as "netting" just requires some form of arithmetic.

345. We note that undamaged accounts can be identified and excluded from our model. Since damages are calculated transaction by transaction, despite proving that all or virtually all class member accounts were harmed by the conspiracy, if the Court deems it necessary to identify and remove the small and insignificant number of undamaged accounts, our

[393] Appendix C, Exhibit C.15.

methodology is fully capable of doing so. As Dr. McCrary agreed during his deposition, the produced data identifies every client account with a specific anonymized ID within each Prime Broker Defendant's data productions.[394]

346. For beneficial owner class members, the transactional data produced by Defendants to date [redacted].[395] The produced transactional data [redacted] But for a given stock loan transaction, multiple beneficial owners may invest through the same agent lender account, and individual beneficial owners may invest in multiple agent lender accounts. This inhibits our current ability to analyze the full set of transaction records for specific individual beneficial owners unless they provide them directly ([redacted]). But if Plaintiffs were to obtain data showing the linkage between agent-lender accounts and specific beneficial owners, it would be simple and mechanical to evaluate which specific beneficial owners had at least one damaged trade. We understand that the Prime Brokers may have such data, but there are other sources as well, including agent lenders or the beneficial owners themselves.

347. We compute damages for each of the named plaintiffs, LACERA, SCERA, OCERA, IPERS, and Torus in Section IV.B.2 below (**Exhibit IV.5**), using all transactional data made available to us for each entity. Damages are [redacted] and [redacted] with adjustments for [redacted] unmatched transactions, and [redacted]

348. We discuss errors in Dr. McCrary's calculations of purported undamaged class members that are driven by his inaccurate processing of data from [redacted] and grossly overstate the percentage of undamaged class members. As replicated in **Exhibit IV.6** below, his report indicated that [redacted][396] This is incorrect. When we correct his [redacted] for his processing errors and all other errors in his data builds, and compute damages under our Opening Report base-case models (which is the same basis on which Dr. McCrary measures his [redacted]) we demonstrate in **Exhibit IV.7** below that [redacted]

[394] McCrary Tr. 261:11-21.
[395] McCrary Report, ¶ 211.
[396] McCrary Report, ¶ 168.

[redacted] he uses in his adaptation of our model. We also discuss errors in Dr. McCrary's processing of [redacted] and [redacted]

349. Lastly, we discuss Dr. McCrary's analysis of the [redacted] for [redacted] and explain why this data, which [redacted] Our findings are shown in **Exhibit IV.8**. **Appendix C** contains details about the construction of our Updated Prime Broker Transactions Datasets and our processing of [redacted] The Appendix also discusses our processing of the named-plaintiff transaction datasets and Dr. McCrary's [redacted] We also address certain criticisms from the Defendants regarding our construction of the data.

A. Key Issues in the Construction of the Transactions Datasets

350. Defendants have ostensibly applied our analysis [redacted] for which we did not calculate damages in our Opening Report. For the sake of argument and to minimize differences of opinion pertaining to small differences in the numbers of stock loan transactions analyzed by Dr. McCrary and us, we have reviewed Dr. McCrary's builds of the data, and where appropriate, relied upon his builds of the Defendant Prime Brokers' stock loans transactions for this report.[397] There were instances, however, where it was necessary to make corrections to his data, and accordingly, differences remain between his compilations of stock loan transactions and ours. We use the term "Updated Prime Broker Transactions Datasets" to refer to the datasets of stock loan transactions that we use in this report and which incorporate Dr. McCrary's data builds, where appropriate. In our Appendix C, we discuss the builds of the Updated Prime Broker Transactions Datasets in greater detail and describe the differences, if any, that remain between Dr. McCrary's construction and ours. In the sections below, we focus on the most significant differences.

[397] Since Dr. McCrary created his "PBD transactions base samples", "PBD transactions analysis sample" and "expanded PBD transactions analysis sample" in "R" programming language, and we have chosen to use SAS, we wrote code to convert his datasets from their R format to our SAS format. In performing these data conversions, we were unable to re-create approximately [redacted]

1. Errors in Dr. McCrary

351. We have reviewed Dr. McCrary's data builds of and determined that he has improperly included that should have been excluded according to the filters discussed in our Opening Report. A vast number of those transactions are recorded as —an economic irrationality. And yet those transactions are in Dr. McCrary's These improperly included transactions are responsible for

352. As explained in our Opening Report, [398] In its original format, as produced by in this litigation, the contained a field called "[399] that identified The stock loan records for which operates as [400] contain the notations " " and " " in the [401] We understand that [402]

353. In contrast, stock loan records for contain a value of " " [403] (not to be confused with the " " as referenced above). conducts securities and operations activities for [404] charges its wealth management

[398] McCrary Report, Appendix C ¶18.
[399] from McCrary Ex. 5808.
[400]
[401] Email from to Christopher Bateman, dated February 8, 2021 ( ).
[402]
[403] *see also* to David Fisher (counsel for plaintiffs), April 27, 2020.
[404] p. 38-39.

clients under a variety of pricing structures; as noted in its Annual Reports, "[redacted]"[405] The stock loan records produced for [redacted] bear this out. The pricing terms on the stock loan records for [redacted] makes clear that [redacted] Based on the cumulative effects of the various data factors we describe below, we believe that [redacted]

354. [redacted] provided descriptions for each field in its data, including fields named "[redacted]" and "[redacted]" [redacted] explained the [redacted] reflects the "[redacted]"[406] while the "[redacted]" field is the "[redacted]"[407] In other words, "[redacted]" is defined as [redacted][408]

355. We tested Dr. McCrary's [redacted] data builds by analyzing each field. We tested the "[redacted]" on each transaction to ensure the reported loan cost was equal to the rebate rate provided in the "[redacted]" field minus the federal funds open rate, widely used as a benchmark rate for stock loan transactions.[409]

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[405] [redacted] p. 40.

[406] November 23, 2020 email from [redacted] to David Fisher (counsel for plaintiffs).

[407] [redacted]

[408] Excerpt from Dr. McCrary's [redacted] code computing [redacted] "[redacted]"

[409] [redacted] Therefore, we have used the Federal Funds Open rate as the benchmark rate for this analysis. As noted in our Opening Report, [redacted] and we use the rate in the data provided by the Prime Broker Defendants. [redacted] we impute a benchmark rate using the Fed Funds Open Rate for stock loans before September 16, 2016 and the Overnight Bank Funding Rate for stock loans from September 16, 2016, through the end of the Data Period. *See* Opening Report, ¶ 375.

356. This test demonstrated a [redacted] —in other words, [redacted]

357. A first indication that [redacted] transaction records are unreliable is their "[redacted]" field values suggest that [redacted] Specifically, [redacted] data in the "[redacted]" field indicates [redacted] Given this economic incongruity, our analysis of [redacted] transactions indicates that the data on transactions terms for the subset of stock loans involving [redacted] (i.e., records with "[redacted]" in the "[redacted]) is not reliable.

358. There is a second indication [redacted] transaction records are unreliable. We observed that [redacted][410] [redacted] In combination with our reconstruction of the "[redacted]" we recognized that [redacted] and we, along with Dr. McCrary, observe from [redacted] Therefore, [redacted] By contrast, the [redacted]

[410] This dataset also includes a field that indicates that [redacted] September 11, 2020 email from [redacted] to David Fisher (counsel for plaintiffs).

EXHIBIT IV.1
PERCENT OF TRANSACTIONS BY ENTITY AND SOURCE

[redacted]

Notes: [redacted] and McCrary Report Transaction Base Sample.

359. Our analysis confirms the [redacted] records are [redacted] Therefore, we conclude that [redacted] Indeed, [redacted] Anomalous records with such characteristics were excluded from our dataset in the Opening Report's analyses of [redacted] Dr. McCrary also conceded in deposition that [redacted][411] And yet, he left them in.

360. A communication received from counsel for [redacted] on September 28, 2021 notes that "[redacted]"[412] This letter appears intended to clarify some ambiguities in Dr. McCrary's deposition [redacted] corresponds to a [redacted] From the outset of our analysis set forth in this section, we have always (both before and after Dr. McCrary's deposition) understood the "[redacted]" field in the [redacted] to refer to [redacted] and the "[redacted]" to refer to [redacted] recent letter accordingly makes no difference to our

[411] McCrary Tr. 242:3-242:17 ([redacted]).

[412] Letter from [redacted] (counsel for [redacted]) to Daniel Brockett, dated September 28, 2021.

analysis here, nor does it detract from that analysis. As explained above, the basis for determining that [redacted] For [redacted] of these transactions, we observe that [redacted]

361. Dr. McCrary testified that when cleaning the [redacted] his goal was to "[redacted]" and to "[redacted]"[413] He did not do this with respect to [redacted] In our Opening Report, we explained that our data processing tests included steps to identify and exclude records with systemic issues, including, but not limited to, records that involved: anomalous values in key fields; loan costs that cannot be determined; entities affiliated with the Prime Broker Defendants (other than their defendant agent lending operations); and internal or administrative transactions not reflecting market prices.[414]

362. Because Dr. McCrary deleted the "[redacted]" field and was thus incapable of distinguishing between "[redacted]" and "[redacted]" records, he was not equipped to recognize that the "[redacted]" records had [redacted] At deposition, he acknowledged that [redacted][415] As Dr. McCrary also acknowledged at his deposition, [redacted][416] Given that these systematic pricing issues are inconsistent with the pricing conventions we have observed in the stock loan transactions produced by other Prime Broker Defendants and our various categories of exclusions, all "[redacted]" records should have been excluded from the data used in the McCrary Report, if Dr. McCrary were to apply the steps in our exclusion method explained above. By including these records, he

[413] McCrary Tr. 240:22-241:16.
[414] We explain this filtering in detail in Part XI.B.2 of our Opening Report. We exclude transaction records that, inter alia, are faulty, are "funding trades," are accounting or administrative relics, are anomalous in key values, reflect transactions between entities affiliated with the Prime Broker Defendants, or have other traits than indicate that they cannot reliably be treated as class member stock loans. Opening Report, ¶¶ 361-372.
[415] McCrary Tr. 252:6-253:5.
[416] McCrary Tr. 233:3-6.

has failed to exclude [redacted]

363. In addition to the "[redacted]" issue, Dr. McCrary improperly included a number of "[redacted]" transactions associated with [redacted] in his [redacted] data build. We understand that "[redacted]" stands for "[redacted]" [redacted][417] Consistent with this understanding that these records represent [redacted] such internal transfers were among the transactions our methodology excludes, as explained in our Opening Report. Dr. McCrary excluded [redacted] from his data build, but approximately [redacted] of the raw data records bearing the "[redacted]" notation remained after he applied this exclusion criteria. We make this adjustment to the [redacted] data in our Updated Prime Broker Transactions Datasets and exclude the remaining [redacted] on the inference that all "[redacted]" records are [redacted]

364. In removing the above records from our build of the [redacted] data, we also recalculate the outlier thresholds for loan costs and notional values using the remaining records. **Exhibit IV.2** demonstrates that while removal of the above records eliminates [redacted] included in the [redacted] McCrary Report data, it [redacted]

[417] [redacted] at p. 1; *see also,* [redacted]

EXHIBIT IV.2
EFFECT OF CORRECTIONS TO MCCRARY [redacted]

[redacted]

2. Errors in Dr. McCrary's [redacted] Dataset

365. We have reviewed Dr. McCrary's data builds pertaining to the [redacted] data and concluded that Dr. McCrary has improperly included [redacted] He has also used an improper OBFR rate and failed to address [redacted] We have made adjustments to the [redacted] transactions in our Updated Prime Broker Transactions Datasets to correct for [redacted] and the improper application of the OBFR rate as described in Appendix C. In our damages computations, we make an adjustment to account for [redacted]

3. Errors in Dr. McCrary's [redacted] Dataset

366. We have also performed a review of Dr. McCrary's [redacted] and [redacted] data builds for [redacted] As regards the [redacted] datasets, [redacted] produced [redacted][418] [redacted][419] Dr. McCrary has chosen to rely upon the [redacted] data but dismisses the [redacted] data stating, "[redacted]

[418] [redacted] (counsel for [redacted]) Letter to Robert Cobbs (counsel for plaintiffs), August 28, 2020.
[419] [redacted] (counsel for [redacted]) Letter to Robert Cobbs (counsel for plaintiffs), October 8, 2020, p 3.

[redacted][420]

367. Our review of [redacted] data confirms that [redacted] However, [redacted] and in correspondence dated August 5, 2021, [redacted] indicated that "[redacted]"[421]

368. The exclusion of all [redacted] records by Dr. McCrary is in error and we have supplemented his [redacted] data to include [redacted] as part of the [redacted] data used in this report and our Updated Prime Broker Transactions Datasets.

4. Adjustments to [redacted] analysis based on Stock Loan Billing files

369. Dr. McCrary observed that in our processing of [redacted] data we did not import certain [redacted] We now incorporate these [redacted] records in our analysis.

370. In addition, the data from [redacted] influence the [redacted] analyses we present in our Opening Report, including our calculation of "w". Accordingly, we have updated our Opening Report analyses and computations of "w" to reflect the effects of these additional transactions.

371. As described in detail in Appendix C, we note that the incorporation of additional transactions from these new sources does not alter any of our findings and conclusions about [redacted] from our Opening Report. We continue to observe [redacted] a finding which is consistent with one of our opinions that an electronic all-to-all platform like [redacted] would generate economic value in drawing additional stock loan supply to the platform and reducing search frictions that exist for certain stocks in the OTC world. We continue to show that [redacted]

[420] McCrary Report, Appendix C, ¶ 8.
[421] [redacted] (counsel for [redacted]) Letter to Robert Cobbs (counsel for plaintiffs), Aug. 5, 2021, p. 5.

[redacted][422] The addition of the new data does not alter our opinion as to the appropriate values for "w" for our economic model and we continue to conclude that the appropriate values for "w" given the facts and circumstances for this case is [redacted] and [redacted] (In Section III.D we discussed the Defendants' experts' criticisms of "w").

B. Damages are [redacted]

1. Summaries of Damages Using All Six Prime Broker Defendants

372. Below we provide our preliminary estimate of damages on stock loans for each Subclass using the methodology set forth in our Opening Report,[423] but now using our Updated Pooled Prime Broker Dataset and Updated Prime Broker Transactions Datasets (both explained further in Appendix C.) This estimate also incorporates a revised and more conservative estimate for F_s of [redacted] and [redacted] (as explained in Section III.E) in addition to the platform fee (F_p) described in our Opening Report.[424] We continue to eliminate from our damage calculations, and in the tables below, all accounts that do not have at least 100 stock loan transactions (as a lender or borrower respectively) over the Data Period, in accordance with the definition of the Class.[425]

373. As shown in **Exhibit IV.3**, our revised estimate of damages for the period January 1, 2012, through the date of our Opening Report is [redacted] for the **Beneficial Owner Subclass** and [redacted] for the **End-User Subclass** for a total of [redacted] These calculations demonstrate our methodology for showing class damages is common for purposes of class certification, but we reserve the option of updating our calculations through trial.

[422] Opening Report, ¶ 217.
[423] Opening Report, Section XI.I.
[424] Opening Report, ¶ 480.
[425] Opening Report, ¶ 508.

EXHIBIT IV.3
DAMAGES BY SUBCLASS THROUGH DATE OF REPORT
WITH ADJUSTMENTS FOR [redacted]

[redacted]

Notes: Updated Prime Broker Transactions Datasets. For the Beneficial-Owner Subclass and End-User Subclass, we are assuming F_s of [redacted] and [redacted] respectively.

374. In the table above, we compute damages *after* applying four additional categories of adjustments. First, we make an adjustment pertaining to [redacted] as explained in Section IV.A.2. The damages for the [redacted] is determined by a regression model, which attempts to measure how [redacted] damages compare to the damages of [redacted] when we are able to compute [redacted] damages. We do this by regressing the estimated [redacted] daily damages to each Subclass on the sum of the daily damages of [redacted] for each Subclass plus an indicator for trading holiday. The coefficient estimate on the independent variable represents the relationship between [redacted] damages and [redacted] damages when we observe both. We use this coefficient estimate (and other coefficients estimated in the regression) together with the damages for [redacted] to forecast the predicted values for [redacted] when [redacted] We then summed the predicted values for [redacted] for each day in [redacted] while controlling for [redacted] Our estimate of damages for the gap period adds [redacted] of damages to the Beneficial Owner Subclass and [redacted] to the End-User Subclass for a total of [redacted]

375. Consistent with our Opening Report we have made a second adjustment for unmatched transactions, that is "[redacted]

[redacted]"[426] within our Updated Prime Broker Transactions Datasets. The frequency of these occurrences declined since our Opening Report with the addition of records from [redacted] These transactions now correspond to [redacted] and [redacted][427] and pertain to estimated damages of [redacted] and [redacted] respectively for a total of [redacted]

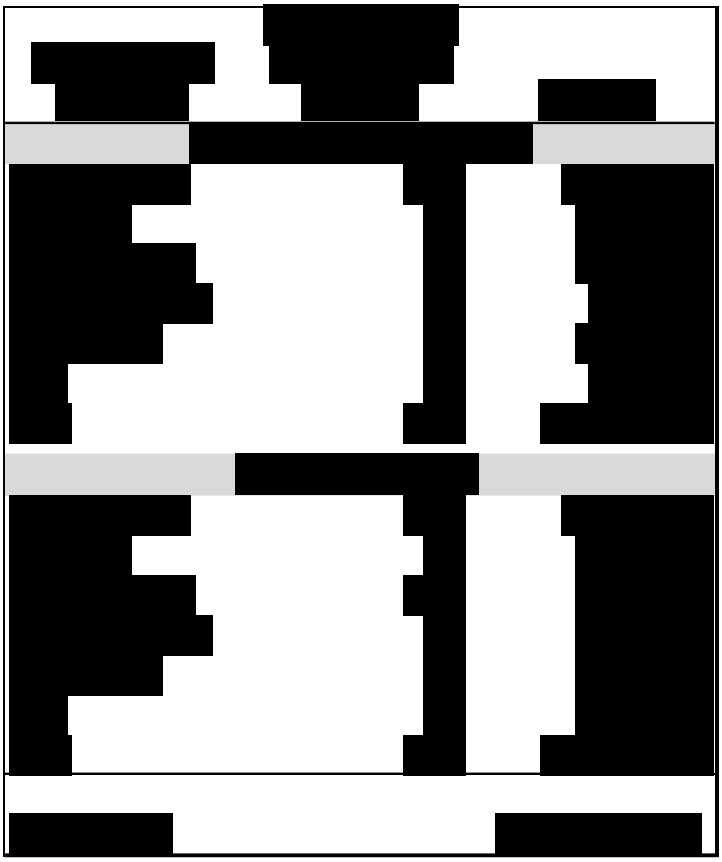
376. Consistent with our Opening Report, we make a third adjustment for [redacted][428] We noted in our Opening Report we were using an interim method that increases our damage estimate by roughly 40%, to adjust for the fact that [redacted] To minimize differences in damages attributable to the differences in the data builds between Dr. McCrary and us, we continue to use this interim method since Dr. McCrary made no attempt to address this issue in his data builds. Our interim adjustment for the estimated damages associated with [redacted] is [redacted] for the Beneficial Owner Subclass and [redacted] for the End-User Subclass for a total of [redacted]

377. Lastly, we make a fourth adjustment to our estimate should it be determined that our damages period should extend beyond December 31, 2017, and through the date of our Opening Report, February 22, 2021. Our damages estimate uses data from the six-year period, January 1, 2012, through December 31, 2017. We continue to conclude that it would be reasonable to multiply our damages estimate, which is calculated through December 31, 2017, by [redacted] to take into consideration the approximately three additional years of stock loan activity through the date of our Opening Report (beyond the [redacted] for which we have received transactions data from the defendants.) This adjustment to estimated damages is [redacted] for the Beneficial Owner Subclass and [redacted] for the End-User Subclass for a total of [redacted]

[426] Opening Report, ¶ 537.
[427] Appendix C, Exhibit C.15.
[428] Opening Report, ¶¶ 519-520.

378. **Exhibit IV.4** summarizes our damages calculation before the four categories of adjustments described above. Damages are [redacted] for the **Beneficial Owner Subclass** and [redacted] for the **End-User Subclass** for a **total** of [redacted]

EXHIBIT IV.4
DAMAGES FOR EACH SUBCLASS BY PRIME BROKER DEFENDANT



Notes: Updated Prime Broker Transactions Datasets. For the Beneficial Owner Subclass, we are assuming F_s of [redacted] and F_s of [redacted] for the End-User Subclass.

2. Damages Calculations for Named Plaintiffs

379. Below we provide our preliminary estimate of damages for the period January 1, 2012, through December 31, 2017 for each named plaintiff: IPERS (Level 1), LACERA (Level 1), OCERS (Level 1), SCERA (Level 1 and Level 2) and Torus (Level 2). For named plaintiffs analyzed by Dr. McCrary (SCERA Level 1 and Level 2), we relied upon his data builds of their stock loan records, after performing our own inspection of the records. For all other plaintiffs (IPERS, LACERA, OCERS and Torus), we performed our own build from the records produced by each. In Appendix C, we describe the files that each named plaintiff produced, and the steps we undertook to compile and assemble each dataset. We note that to the best of our ability our

builds included applying the same record "exclusions" to the named plaintiff data that we applied to the productions by the Prime Broker Defendants.[429]

380. We compute damages on stock loans for each named plaintiff using the methodology set forth in our Opening Report.[430] As shown in **Exhibit IV.5**, our estimate of gross damages for the period January 1, 2012, through December 31, 2017, using a value of F_s of [redacted] for the Beneficial Owner Subclass and [redacted] for the End-User Subclass and a platform fee equal to F_p, is shown below for each plaintiff. Amounts shown reflect adjustments for [redacted] (as applicable).[431] We reserve the right to update this calculation when transactions data is made available to confirm the stock loan volumes traded in period subsequent to December 31, 2017.

[429] Opening Report, ¶¶ 367-378.
[430] Opening Report, Section XI.I.
[431] Opening Report, ¶¶ 520, 537-540. No adjustments for [redacted] data were made to Beneficial Owner Subclass named plaintiffs damages because we rely on their data productions rather than that of [redacted] We adjusted SCERA's damages at Level 2 for [redacted] data by taking SCERA's pro rata share of the predicted damages that occurred during missing data period. As with the data produced by the Prime Broker Defendants for the Class, the named-plaintiff datasets inconsistently provided information on stock loan positions that remained open over weekends and we have made our adjustment for this inconsistency in the same manner as made for the Class, that is, to multiply the damages by [redacted] No adjustment has been made to account for damages that may have occurred after December 31, 2017 through the date of our Opening Report.

EXHIBIT IV.5
NAMED PLAINTIFF DAMAGES

[redacted]

Note: Named Plaintiff Transactions Datasets. For the Beneficial Owner Subclass, we are assuming F_s of [redacted] and F_s of [redacted] for the End-User Subclass.

C. [redacted]

1. Dr. McCrary's Errors on [redacted]

381. In Section 3.2 of his report, Dr. McCrary states that "[redacted]"[432] He presents these conclusions in his Exhibit 11, as [redacted][433]

MCCRARY REPORT EXHIBIT 11

[redacted]

382. Even though Dr. McCrary stated at his deposition that [redacted]

[redacted]

[432] McCrary Report, ¶ 167.
[433] The results presented in this section are "netted" so that we can compare directly to Dr. McCrary's analysis.

[redacted] nowhere in his report does he take that next step to make the calculation.[434] He does not investigate what is driving [redacted][435] or [redacted].[436]

383. In fact, his data show that [redacted] It is driven by [redacted] who, according to Dr. McCrary, [redacted] For the [redacted] percentage to be [redacted] However, [redacted][437] as we illustrate in **Exhibit IV.6**:

EXHIBIT IV.6
MCCRARY REPORT EXHIBIT 11 (REPLICATION)

[redacted]

Notes: McCrary Report Transaction Analysis Sample. Analysis is from the McCrary Report's "Baseline" estimate of [redacted] as in our Opening Report. Exhibit replicated using backup materials to McCrary Report. Pooled Number of Short Seller Accounts in McCrary Exhibit 11 is [redacted]

384. As explained in Section IV.A.1, we have reviewed Dr. McCrary's data builds for [redacted] and determined that [redacted] The results speak for themselves. As demonstrated in **Exhibit IV.7** below, when we correct for Dr. McCrary's processing errors of the [redacted] database (and all other data issues discussed in Sections IV.A and Appendix C) but

[434] McCrary Tr. 222:20-224:12.
[435] McCrary Tr. 223:7-23, 224:5-12.
[436] McCrary Tr. 223:24-224:4.
[437] The results presented in this chart are measured on the base case in our Opening Report and consistent with the methodology followed by Dr. McCrary for his report exhibit.

retain his measure of net damages (to isolate the impact of his data processing errors here, as opposed to the impact of using his netting rules), [redacted] This [redacted] is in line with [redacted] (These estimates of undamaged class members are based on the assumptions used by Dr. McCrary in his exhibit and the modeling inputs used in our Opening Report.[438])

EXHIBIT IV.7
MCCRARY REPORT EXHIBIT 11 SHORT SELLER ACCOUNTS
UPDATED FOR [redacted] AND OTHER DATA CORRECTIONS

[redacted]

Notes: Updated Prime Broker Transactions Data. Net uninjured counterparties are for the End-User Subclass, with the modeling inputs of the Opening Report.

385. Of course, none of this would be visible from the [redacted] that Dr. McCrary presented in Exhibit 11 of his report. But the impact of correcting the [redacted] database is significant. Exhibit IV.7 demonstrates that on a pooled basis the total number of [redacted]

386. When questioned on this point at his deposition, Dr. McCrary admitted [redacted][439] Nor was he aware

[438] Opening Report, ¶ 483-496.
[439] McCrary Tr. 254:19-255:3. The [redacted] referenced in his deposition pertains to [redacted]

that [redacted] [440]

2. Agency Lender Disclosure Data

387. Dr. McCrary argues that individualized inquiry is necessary to determine whether class members were harmed due to the "[redacted]"[441] In his Exhibit 12, he uses the [redacted] data produced by [redacted] to further disaggregate the [redacted] data into [redacted] [442]

388. Dr. McCrary notes these [redacted] have multiple lending accounts with [redacted], totaling [redacted] that contain [redacted] He concludes that if he applies our Opening Report damages methodology to [redacted] but if the damages methodology is applied to [redacted] In other words, he asserts that his analysis shows that our Opening Report damages model would result in [redacted] in comparison to [redacted] [443] Dr. McCrary's analysis is misleading.

389. First, we filter Dr. McCrary's [redacted] to exclude accounts that [redacted] (to replicate the Class Definition[444]) recognizing that we are limited for purposes of this analysis to applying the Class Definition to just the subset of accounts with [redacted] that Dr. McCrary selects. This adjustment [redacted]

[440] McCrary Tr. 255:4-9. 256:17-258:2. The [redacted] pertains to [redacted] as explained in our Appendix C.
[441] McCrary Report ¶ 169.
[442] We have not analyzed, nor has Dr. McCrary, the [redacted] data files which may contain [redacted] *See*, *e.g.*, [redacted] (counsel for [redacted]) Letter to S. Rand (counsel for plaintiffs), April 26, 2019, p. 14.
[443] McCrary Report ¶ 169, Exhibit 12.
[444] Opening Report ¶ 14.

[redacted]

This calculation, while an imperfect application of the Class Definition because it applies only to [redacted] nonetheless demonstrates that Dr. McCrary's results are distorted by [redacted] as shown in Exhibit IV.8 below.

390. Second, using the same data and methodology used by Dr. McCrary for his Exhibit 12, which we believe is improper as explained below, we show in **Exhibit IV.8** that [redacted] When we also apply the 100-loan-day class definition restriction to the [redacted] there are [redacted] affecting [redacted]

EXHIBIT IV.8
ANALYSIS OF [redacted]

[redacted]

Notes: [redacted] and Updated Prime Broker Transactions Datasets. Data is restricted to Warm and Hot CUSIPs from 2012-2017. Only CUSIP-Days that appear in both datasets are included in the analysis.

391. We further note that Dr. McCrary's analysis is flawed in its construction in the following ways. First, Dr. McCrary admits in his Appendix Exhibit C.11 that [redacted]

[redacted] and [redacted] Second, Dr. McCrary overlooks the possibility that [redacted] This issue was addressed in a document cited by Dr. McCrary in which the Agency Lending Disclosure Taskforce observed, in December 2006, that "Since pseudo tax IDs are created at the request of individual agent lenders, two lenders could obtain 2 different pseudo IDs from DTCC for the same legal entity if the specified names and addresses are different. These types of situations, when identified by a broker-dealer, must be resolved manually between the broker-dealer and agent lenders involved."[445] The task force similarly noted that, "In cases where a principal lends through multiple agents, a broker-dealer should expect to receive an Add/Delete request for that principal from each of the agent lenders. The broker-dealer is required to send a response to each agent lender."[446] We do not know whether [redacted] ever applied the fixes noted by the Agency Lender Disclosure Taskforce to the specific data that was provided here. But Dr. McCrary provides no evidence that this possibility was considered in his analysis and that he undertook any procedures to correct for this potential deficiency in the underlying data. Without such assurance that there is not duplication of account IDs in the [redacted] data, his analysis is unreliable.

392. We further note that we do not have a measure of all of the beneficial owner's activity even if the [redacted] data were correct. The beneficial owner can transact with [redacted] who lends to [redacted] and [redacted] In this analysis, we would only be capturing the beneficial owner's lending activity to [redacted] and not the other banks. Thus, this exercise is incomplete by definition. However, with a comprehensive set of [redacted] data and beneficial owner identifiers -information that the Prime Broker Defendants should possess – or the beneficial owners' own transaction data, our damage model could be used to determine which beneficial owners sustained no damages under our conservative approach.

[445] *See* "The A-Z Guide to ALD: A Comprehensive Set of Guidelines for Broker-Dealers and Agent Lenders Participating in Securities Lending on an Agency Basis," Agency Lending Disclosure Taskforce, December 7, 2006, p. 17.
[446] *See id*. at p. 22.

3. Damages to SCERA, Torus and Vanguard

393. Dr. McCrary selects three class members, SCERA, Torus and Vanguard, to "illustrate the need for individualized analysis of harm."[447] In particular, he asserts Torus would not benefit from platform trading because the fixed platform trading costs "would have been prohibitive."[448] Dr. McCrary is wrong about the role of fixed platform trading costs. Absent the conspiracy, electronic platforms would offer different pricing structures to attract volume to the platforms and with competition among platforms, such pricing would be driven to competitive levels. Moreover, the expenditure required to connect to the platform (including all platform fixed fees) would typically be incurred by the agent lender or prime broker and then spread across all market participants who sought sponsored access to the platform.[449] Once spread over a substantial number of short seller trades, this fixed cost would translate into a minimal charge embedded into the sponsorship cost per trade. By way of example, [redacted] did sponsor clients onto [redacted] and sponsored client access to other stock loan technology

[447] McCrary Report ¶ 201.
[448] McCrary Report ¶ 203.
[449] [redacted] to prospective client [redacted] represents that [redacted] "[redacted] " *See,* "[redacted] " November 2011, [redacted] at 2683. As a comparable example, in a [redacted] is asked, "[redacted] It responds, [redacted] " Similarly, in questions regarding its "[redacted] " [redacted] represents that, [redacted] " Related, "[redacted] […] [redacted] " See, "[redacted] " July 13, 2015, [redacted] at 9374, 9377 - 9378. [redacted].

platforms they offered.[450] As explained in Section III.3, fixed platform costs could be waived for smaller clients, and there is further evidence that [redacted] sometimes waived its fees.[451]

394. Next, Dr. McCrary asserts that SCERA was undamaged given realistic platform sponsorship costs. Dr. McCrary is incorrect as he bases his opinion on Dr. Hendershott's incorrect estimates of sponsorship costs of [redacted] and [redacted][452] As we demonstrate in Section IV.B.2, even using our conservative estimates of sponsorship costs, SCERA is [redacted] and [redacted] respectively. Dr. McCrary then asserts that since "[redacted]" [redacted][453] But as we explained in our Opening Report, we expect GC lending volume to increase in the but-for world, not decrease, consistent with our supply and demand structure. Dr. McCrary fails to take this factor into consideration. Moreover, even under his assumption that lenders would see a decline in their GC utilization in the but-for world, Dr. McCrary assumes, without any basis, that [redacted] Indeed, Dr. McCrary makes no attempt to analyze whether any of SCERA's GC lending represented such excess utilization, and if so, how much. Finally, SCERA's impact, like any other class members, should be analyzed through the lens of our general *impact* framework, not our damages calculation. Lastly, while we do not agree with Dr. McCrary's estimate of lost GC revenue of [redacted] for the sake of argument, SCERA damages are [redacted]

395. Dr. McCrary then turns to Vanguard and concludes that "[redacted]"[454] We discussed Vanguard in Section II.A. It was one of three agent

[450] In its [redacted] represents that "[redacted]" and that "[redacted] May 26, 2010, [redacted] at 9441.
[451] *See,* Section III.E.3
[452] McCrary Report, Exhibit 18.
[453] McCrary Report, ¶ 209.
[454] McCrary Report, ¶ 212.

lenders that Dr. McCrary cites as [redacted] and we showed in Exhibit II.11 that [redacted] Next Dr. McCrary claims that to determine whether Vanguard was harmed requires a determination of whether Vanguard would have needed a platform sponsor in the but-for world.[455] As we explained in Section III.E., our damages model is conservative and includes a sponsorship cost for each transaction, regardless of whether a particular transaction would occur on a platform or OTC. This methodology negates the need to perform the precise individualized inquiry that Dr. McCrary asserts.

Dr. McCrary then claims that if every account in our data associated with Vanguard is treated as a separate entity, [redacted]

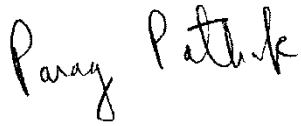
[455] McCrary Report, ¶ 214.

Respectfully submitted,

Paul Asquith

Date: October 5, 2021

Respectfully submitted,



Parag Pathak

Date: October 5, 2021

APPENDIX A – CURRICULA VITAE

October 1, 2021

Paul Asquith

Massachusetts Institute of Technology
Sloan School of Management
100 Main Street, Bldg. E62-660
Cambridge, MA 02142-1347

Phone: (617) 253-7177
Email: pasquith@mit.edu

Education

University of Chicago,	Ph.D., Economics	1980
University of Chicago,	A.M., Economics	1972
Michigan State University,	B.A., Economics	1970

Principal Fields of Interest

Corporate Finance, Capital Markets

Academic Experience

Gordon Y. Billard Professor of Finance, Massachusetts Institute of Technology, Sloan School of Management, Cambridge, MA, July 2006-present, NTU Professor of Management, July 1996-June 2006, Professor, July 1994-present, Associate Professor, July 1991-June 1994, Visiting Associate Professor, July 1989-June 1991.

Visiting Professor, Imperial College, Imperial College of Business, London, U,K., September 2018-July 2019.

Visiting Professor, Duke University, Fuqua School of Business, Durham, NC, September 1996-August 1997.

Senior Associate Dean, Massachusetts Institute of Technology, Sloan School of Management, Cambridge, MA, July 1994-June 1996.

Associate Professor, Harvard University, Graduate School of Business Administration, Cambridge, MA, July 1984-September 1989, Assistant Professor, July 1979-June 1984.

Instructor, University of Chicago, Graduate School of Business, Chicago, IL., June 1978-May 1979.

October 1, 2021

Graduate Teaching: Courses and Awards

Courses:

M.I.T, MBA-Security Design: course on how and why new financial instruments are introduced in the capital market.

M.I.T, MBA-Advanced Corporate Finance.

M.I.T, MBA-Mergers and Acquisitions: strategic, valuation and execution issues in mergers.

M.I.T., MBA-Corporate Finance: first course in corporate finance.

Duke, MBA-Advanced Corporate Finance.

Harvard, MBA-First Year Finance: initial finance course.

Harvard, MBA-Corporate Financial Management: advanced course in corporate finance.

Harvard, Ph.D.-Corporate Finance, An Empirical Approach: two-semester course in corporate finance research.

University of Chicago, MBA-Microeconomics: economic theory course.

University of Chicago, MBA-Corporation Finance: first course in corporate finance.

Teaching Awards: (Awards Voted by Students)

Sloan School of Management, Jamieson Prize for Excellence in Teaching 2006-2007, this was the inaugural year for this award.

Sloan School of Management, Teaching Excellence Award 2005-2006.

Sloan School of Management, Teaching Excellence Award 2001-2002.

Sloan School of Management, Teaching Excellence Award 2000-2001.

Sloan School of Management, Teaching Excellence Award 1999-2000.

Sloan School of Management, Teaching Excellence Award 1998-1999.

Fuqua School of Business, Chrysler Teacher of the Year 1996-1997.

Sloan School of Management, Teaching Excellence Award 1995-1996.

Sloan School of Management, Teacher of the Year 1992-1993.

Sloan School of Management, Teaching Excellence Award 1991-1992.

Sloan School of Management, Teaching Excellence Award 1990-1991.

Sloan School of Management, Teacher of the Year 1989-1990.

Harvard Business School, Outstanding Teacher Award 1988-1989.

Harvard Business School, Outstanding Teacher Award 1987-1988.
1987-88 was the first year for the award

October 1, 2021

Publications

Books

Lessons in Corporate Finance: A Case Studies Approach to Financial Tools, Financial Policies, and Valuation, with Lawrence Weiss, Wiley, April 2016. Second Edition, April, 2019. Translated into Chinese and Korean

Journal Articles

"The Market for Borrowing Corporate Bonds," *Journal of Financial Economics, January 2013* (with Andrea Au, Thomas Covert, and Parag Pathak).

"Short Sales and Trade Classification Algorithms," *Journal of Financial Markets,* February 2010 (with Rebecca Oman and Christopher Safaya)

"Performance Pricing in Debt Contracts," *Journal of Accounting and Economics*, December 2005 (with Anne Beatty and Joseph Weber).

"Short Interest, Institutional Ownership, and Stock Returns," *Journal of Financial Economics*, November 2005 (with Parag Pathak and Jay Ritter).

"Information Content of Equity Analyst Reports," *Journal of Financial Economics*, February 2005 (with Michael Mikhail and Andrea Au).

"Convertible Bonds Are Not Called Late," *Journal of Finance*, September 1995.

"Anatomy of Financial Distress: An Examination of Junk-Bond Issuers," *Quarterly Journal of Economics*, August 1994 (with Robert Gertner and David Scharfstein).

"Convertible Debt: Corporate Call Policy, and Voluntary Conversion," *Journal of Finance*, September 1991 (with David W. Mullins, Jr.).

"Event Risk, Covenants, and Bond Holder Returns in Leveraged Buyouts," *Journal of Financial Economics*, September 1990 (with Thierry Wizman).

"Original Issue High Yield Bonds: Aging Analyses of Defaults, Exchanges, and Calls" *Journal of Finance*, September 1989 (with David Mullins and Eric Wolff). Winner of the 1989 American Finance Association Smith-Breeden Award.

"Earnings and Stock Splits" *Accounting Review*, July 1989 (with Paul Healy and Krishna Palepu).

"Merger Returns and the Form of Financing" *Proceedings: CRSP Seminar on the Analysis of Security Prices*, May 1987 (with R. Bruner and David W. Mullins, Jr.).

"Signalling with Dividends, Stock Repurchases, and Equity Issues," *Financial Management*, Autumn 1986, (with David W. Mullins, Jr.).

"Equity Issues and Offering Dilution," *Journal of Financial Economics*, January 1986 (with David W. Mullins, Jr.). Reprinted in Edwards, Franks, Mayer, and Schafer, Recent Developments in Corporate Finance. Winner *Journal of Financial Economics* "All-Star Paper Award".

"Changes in Dividend Policy and Stock Trading Volume," *Proceedings: CRSP Seminar on the Analysis of Security Prices*, May 1985 (with William Krasker).

"The Gains to Bidding Firms from Merger," *Journal of Financial Economics*, April 1983 (with R. Bruner and David W. Mullins, Jr.). Winner *Journal of Financial Economics* "All-Star Paper Award".

"Mergers Bids, Market Uncertainty and Stockholder Returns," *Journal of Financial Economics*, April 1983. Winner *Journal of Financial Economics* "All-Star Paper Award".

"The Impact of Initiating Dividend Payments on Shareholder's Wealth," *Journal of Business*, January 1983 (with David W. Mullins, Jr.). Reprinted in Jensen and Smith, Readings in Corporate Finance.

"The Impact of Mergers on the Participating Securityholders," *Journal of Finance*, December 1982 (with E. Han Kim).

Working Papers

"TRACE and Infrequently Traded Bonds," (with Thomas Covert and Parag Pathak), submitted to the Journal of Financial Economics.

"Rebuttal of short sales, long sales, and the Lee-Ready trade classification algorithm revisited" (with Rebecca Oman and Christopher Safaya).

"Reverse Mergers as a Test for IPO Theories," (with Kevin Rock)

"Bond IPOs," (with Abhishek Dev)

Course Material: Cases

Goodyear: Restructuring, HBS Case Services, 9-288-046, 1988.

Owens Corning Fiberglas, HBS Case Services, 9-288-021, 1988.

Walt Disney Company: Greenmail, HBS Case Services, 9-288-045, 1988.

TRW: 1985, HBS Case Services, 9-228-047, 1988.

Home Shopping Network, HBS Case Services, 9-228-043, 1988.

Leveraged Betas and the Cost of Equity, with David Mullins, HBS Case Services, 9-288-036, 1988.

Marriott Corporation, HBS Case Services, 9-282-042, 1986.

Napco (B), with Carl Kester and David Mullins, HBS Case Services, 9-283-041, 1983.

Napco (A), with Carl Kester and David Mullins, HBS Case Services, 9-283-040, 1983.

Note on Corporate Mergers, HBS Case Services, 1-282-088, 1982.

Chicago and Northwestern Railway Co., HBS Cases Services, 9-282-033, 1981.

Course Material: Teaching Notes

Goodyear: Restructuring, 1988.

Owens Corning Fiberglas, 1988.

TRW: 1985, 1988.

Walt Disney Company: Greenmail, 1988.

Home Shopping Network, 1988.

Capital Market Execution: Recent Financings, with David Mullins, 1987.

Basic Capital Markets, with David Mullins, 1987.

Marriott Corporation, 1986.

Napco, with Carl Kester and David Mullins, 1983.

Chicago and Northwestern Railway Co., 1981.

Research Awards and Academic Honors

American Finance Association, 1989 Smith-Breeden Award, First Place Paper: "Original Issue High Yield Bonds: Aging Analyses of Defaults, Exchanges, and Calls".

Journal of Financial Economics, "All Star Paper Award", (Three Papers):
"Merger Bids, Market Uncertainty and Stockholder Returns"
"The Gains to Bidding Firms From Merger"
"Equity Issues and Offering Dilution"

Q Institute Research Award for "The Effect of Short Sale Constraints on Shorting Volume and Price Formation," September 2006.

Graduate: NSF Fellowship, Ford Foundation Fellowship, Charles R. Walgreen Foundation Fellowship

Undergraduate: National Merit Finalist, General Motors Scholar

Selected Professional Activities

Research Associate, National Bureau of Economic Research, April 1992-present.

Associate Editor - *Financial Management*, July 1993 – August 1998.

Associate Editor - *Journal of Financial and Quantitative Analysis*, June 1985 – August 1997.

Associate Editor - *Journal of Financial Economics*, January 1984 - July 1991.

Referee:

Accounting Review	*Journal of Accounting and Economics*
Financial Management	*Journal of Financial and Quantitative Analysis*
American Economic Review	*Journal of Political Economy*
Harvard Business Review	*Rand Journal of Economics*
Journal of Business	*Quarterly Journal of Economics*
Journal of Finance	*Review of Financial Studies*
Sloan Management Review	*Journal of Financial Economics*

Significant Administrative Activities

Chairman, Sloan Building Committee, 1998-2010. Chaired committee that planned and constructed the new Sloan Building, E62.

Sloan Gender Equity Committee, Member 1998-present, Co-Chair 2008-present. Original and current member of standing Institute Committee on gender.

Group Head: Finance Group 1997-2004, Accounting Group 1997-2005, 2009-2010.

Assistant Group Head: Finance Group 2011-present.

Senior Associate Dean, Massachusetts Institute of Technology, Sloan School of Management, Cambridge, MA, July 1994-June 1996.

M.I.T. Finance Research Center, Co-Director, September 1996- June 1999. Associate Director, May 1991-June 1994.

Seminar Presentations at Universities

5/13/97	Duke University Finance Seminar
4/21/97	University of North Carolina Finance Seminar
4/19/95	University of North Carolina Finance Seminar
4/18/95	Duke University Finance Seminar
4/22/94	Ohio State University Finance Seminar

11/19/93	Boston College Finance Seminar
4/2/93	Georgetown University Finance Seminar
4/30/92	Boston University Finance Seminar
11/8/91	Notre Dame University Finance Seminar
11/7/91	University of Michigan Finance Seminar
11/1/91	Harvard University Finance Seminar
10/16/91	M.I.T. Finance Seminar
4/26/91	Indiana University Finance Seminar
10/13/89	UCLA Finance Seminar
4/4/89	University of Chicago Finance Seminar
11/11/88	University of Georgia Finance Seminar
10/21/88	Dartmouth Finance Seminar
5/20/87	Northwestern University Finance Seminar
5/15/87	Virginia Tech Finance Seminar
12/11/86	Wharton Finance Seminar
11/7/86	University of Michigan Finance Seminar
11/5/86	Stanford University Finance Seminar
3/25/85	University of Toronto Finance Seminar
11/29/83	North Carolina University Finance Seminar
11/28/83	Duke University Finance Seminar
11/4/83	University of Chicago Finance Seminar
6/16/83	University of Rochester Finance Seminar
5/21/81	Dartmouth Finance Seminar
4/5/81	M.I.T. Finance Seminar
12/15/80	University of Michigan Finance Seminar

Conference Presentations as Speaker, Discussant, or Panel Member

9/08	Presentation-Conference to Honor Stewart Myers
8/94	Presentation-NBER Conference on Corporate Finance, Cambridge, MA.
6/94	Presentation-NBER Conference on Asset Pricing, Cambridge, MA.

1/3-5/94	Chaired session on Financial Distress at the American Finance Association meetings, Boston, MA.
1/3-5/92	Chaired session on Mergers and Acquisitions at the American Finance Association meetings, New Orleans, LA.
8/91	Presentation-NBER Conference on Corporate Finance, Cambridge, MA.
6/27-28/91	Discussant - Rutgers Center for Research in Regulated Industries Conference on Leverage, Workouts, and Bankruptcy, New York, NY.
5/4/90	Presentation-Center for Research in Security Prices Conference Chicago, IL.
2/15/90	Presentation-Wharton Conference in Investment Management, Philadelphia, PA.
12/28/89	Presentation-American Finance Association meeting, Atlanta, GA.
11/10/89	Presentation-Center for Research in Security Prices Conference Chicago, IL.
10/20/89	Presentation-Financial Management Association Meetings, Boston, MA.
9/15/89	Presentation-Garn Institute of Finance Meetings, Snow Mass, UT.
8/89	Presentation-NBER Conference on Corporate Finance, Cambridge, MA.
8/88	Presentation-National Bureau of Economic Research Conference on Corporate Finance, Cambridge, MA.
7/87	Presentation-National Bureau of Economic Research Conference on Mergers, Cambridge, MA.
5/27/87	Discussant-Managerial Economics Research Center Symposium on Corporate Control, Rochester, N.Y.
5/8/87	Presentation-Center for Research in Security Prices Conference, Chicago, IL.
8/85	Presentation-NBER Conference on Corporate Finance, Cambridge, MA.
12/28/85	Discussant-American Finance Association meetings New York, N.Y.
9/2-6/85	Presentation-Center for Economic Policy Research, Oxford, England.
5/9/85	Presentation-Center for Research in Security Prices Conference, Chicago, IL.

4/26/85	Presentation-Managerial Economics Research Center Symposium on Investment Banking and the Capital Acquisition Process, Rochester, N.Y.
4/10/85	Presentation-Financial Executive Research Foundation, Harvard Business School.
12/27/84	Discussant-American Finance Association meetings, Dallas, TX.
6/20/84	Presentation-Western Finance Association meetings, Vancouver, B.C.
11/16/83	Presentation-Center for Research in Security Prices Conference, Chicago, IL.
9/22/83	Invited Participant-American Corporate Counsel Association's Symposium on the ALI Corporate Governance Proposals, New York, N.Y.
6/30/83	Invited Participant-NYSE Seminar on Corporate Takeovers, Kennedy School of Government, Harvard University.
4/7-9/83	Presentation-Managerial Economic Research Center Symposium on Corporate Control, Rochester, N.Y
3/11/83	Discussant-Eastern Economic Association meetings, Boston, MA.
6/18/82	Presentation-Western Finance Association meetings, Portland, OR.
11/5-6/81	Presentation-Center for Research in Security Prices Conference, Chicago, IL.
5/6-7/81	Presentation-Center for Research in Security Prices Conference, Chicago, IL.
10/23/80	Discussant-Financial Management Association meetings, New Orleans, LA.

Thesis Supervision

M.I.T. Ph.D. Thesis Committee Member

Eric Wolff, "The Speed of Corporate Downsizing and Corporate Performance," 1998.
Initial placement: Carnegie Mellon.

Ming-Yi Hung, "Information and Trading Risks in Global Investing," 1998.
Initial placement: University of Southern California.

Crack, Timothy, "Three Essays on Market Microstructure," 1996.
Initial placement: Indiana University.

Cohen, Benjamin, "The Maturity Structure of Corporate Liabilities," 1995.
Initial placement: Bank of International Settlements.

Beatty, Anne, "The Announcement Effect of Employee Stock Option (ESOP) Transactions," 1991. Initial placement: University of Pennsylvania.

Meulbroek, Lisa, "An Empirical Analysis of Insider Trading and the Stock Market," 1990. Initial placement: Harvard University.

Dierkens, Nathalie, "Information Asymmetry and Equity Issues," 1988. Initial placement: INSEAD.

McLaughlin, Robyn, "The Impact of Investment Bankers on Tender Offers," 1987. Initial placement: Boston College.

Harvard Ph.D. Thesis Committee Member

Tufano, Peter, "Three Essays on Financial Innovation," 1989. Initial placement: Harvard University.

Thorton, Willie, "Differential Information, Estimation Risk, and Their Impact on Security Returns," 1989. Initial placement: Emory University.

Kaplan, Steven, "Sources of Value in Management Buyouts," 1988. Initial placement: University of Chicago.

Krishnamurthi, Sudhir, "The Impact of Size on Security Returns Reaction to Quarterly Earnings Announcements," 1984. Initial placement: Massachusetts Institute of Technology.

Bruner, Robert, "Merger Returns and the Order Hypothesis," 1982. Initial placement: University of Virginia.

M.I.T. M.S. Supervisor

MacQuarrie, Michelle, "Capital Structure of Small Technology Companies," Spring 1994.

McCourt, Jamie, "Short-Selling," Spring 1994.

Mehos, Stephen, "High Yield Bond New Issues Used to Finance Acquisitions During 1993," Spring 1994.

Vegas, Nicolas, "Asset Restructuring for Corporations," Spring 1993.

Ahmad, Amir K., "The History and Future of the Secuiritization of Developing Country Debt," Spring 1993.

Art, Jonathan, "Financial Product Innovation: A Review of Selected New Capital Market Products," Spring 1992.

Ling, Katrina, "Asset Restructuring: Economic Value of Corporate Spin-Offs," Spring 1992.

Mellish, Martin C.B., "Barbarians Within: The Bankrupting Of Interco Incorporated," Spring 1992.

Ward, John H., "Strategic Alliances, A Case Study of Mail Boxes Etc.," Spring 1992.

Peterson, Jennifer, "Michigan General: Financial Distress," Fall 1991.

Zhang, Heng, "Relative Performance of Reverse LBO Companies," Spring 1990.

Ryan, John, "The Use of Employee Benefit Plans as a Defensive Weapon in Hostile Tender Offers," Harvard MBA-J.D., 1985.

M.I.T. M.S. Reader

Tan, Choon Kwang, "Valuation and Initial Public Offering in Asian Markets: A Case Study of a Singapore Engineering Firm," Spring 1993

Neto, Nicola Calicchio, "Are Japanese and German Takeovers of American Companies More Successful Than Domestic Deals in the U.S.?," Spring 1992.

Maqbool, Imran, "Privatization in Pakistan," Spring 1992.

Di Tizio, Francesco, "Information Technology and Its Role in the Financial Markets Arena," 1991.

Undergraduate Thesis Supervisor

Parnassa, Peter, "The Returns From Speculation in Financially Distressed Firms," 1990, M.I.T.

Bisconti, Benjamin, "Call Delays of Convertible Bonds: An Examination of the Signalling and Cash-Flow Advantage Theories," 1990, Harvard.

Wolff, Eric, "Measuring the Return Rate of High Yield Bonds: An Examination of the High Yield Bonds Issued in 1982," 1988, Harvard.

Wright, Alyce, "Comparing the Returns in Conglomerate and Non Conglomerate Mergers: Real vs Financial Synergies," 1987, Harvard.

Williams, Eugene, "Patterns of Conglomerate Merger: The Evidence of the 1960s," 1982, Harvard.

Directorships and Significant Project Consulting or Litigation Activities:

Director: Aurora Technology Acquisition Corp., 2021-present.

Director: Aurora National Life Assurance Company, 1991-1995.

Merck, 1991-1998.

J.P. Morgan, 1989-1997.

Salomon Brothers, 1985-1989.

Citibank, 1981-1994.

Consultant, Overstock.Com vs Morgan Stanley & Co., et. al., 2012, 2015

Consultant, Iowa Public Employees Retirement System, et. al. vs. Bank of America et. al., 2017, 2018, 2019

Expert Witness, Furtherfield Partners LP vs Ronald O. Perelman et al and M& F Worldwide Corp, Delaware Chancery Court, Wilmington, Delaware, 2002.

Expert Witness, Envirodyne Fraudulent Conveyance Suit, Federal Judicial Court, Chicago, Illinois, 1993.

Expert Report, Telesphere Liquidating Trust vs Ronald J. Haan, 1996.

Expert Report, New America High Income Fund Litigation, 1993.

Parag A. Pathak

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Education

Ph.D., Harvard, Business Economics, 2003-2007.
S.M., Harvard, Applied Mathematics, 2002.
A.B., Harvard, *summa cum laude* in Applied Mathematics, 2002.

Current Employment

Massachusetts Institute of Technology
- Class of 1922 Professor of Economics, 2020-.
- Jane Berkowitz Carlton and Dennis William Carlton
  - Professor of Microeconomics, 2016-2020.
- Professor of Economics, 2014-.
- Associate Professor of Economics (with Tenure), 2011-2014.
- Economics Career Development Assistant Professor of Economics, 2009-2011.
- Assistant Professor of Economics, 2008-2009.

National Bureau of Economic Research
- Co-director (and founder), Working Group on Market Design, 2008-.
- Faculty Research Fellow, 2008-2011.
- Faculty Research Associate, 2011-.

Former or Visiting Positions

Harvard University
- Junior Fellow, Society of Fellows, 2007-2009.

Stanford Graduate School of Business
- Visiting Assistant Professor of Economics, 2010-2011.

Harvard University
- Visiting Professor of Economics, 2015-2016.

Microsoft Research New England
- Weekly Visitor, 2015-2016.

Honors and Awards

Named by *Science News* as one of the Top 10 Young Scientists to Watch, 2019.
John Bates Clark Medal, American Economic Association, 2018.
Fellow of the American Academy of Arts and Sciences, 2018.
Named by the *Economist* as one of the decades top eight young economists, 2018.
Fellow of Econometric Society, 2016.
Social Choice and Welfare Prize, Society for Social Choice and Welfare, 2016.
Named one of the top 25 Economists under age 45 by the IMF, 2014.
NSF Presidential Early Career Award for Scientists and Engineers, 2012.
Alfred P. Sloan Research Fellow, 2012-2013.
Undergraduate Economics Association's Teaching Award, 2010.
MIT Economics Career Development Chair, 2009.
Hernstein Prize for Best Dissertation in Social Sciences at Harvard, 2007.
Review of Economic Studies Tour, 2007.
State Farm Companies Doctoral Dissertation Award, 2006.
George S. Dively Award for Outstanding Pre-Dissertation Research, 2005.
National Science Foundation Graduate Research Fellowship, 2003.
Paul and Daisy Soros Fellowship for New Americans, 2003.
Chateaubriand Fellowship (Ambassade de France), 2002.
Phi Beta Kappa, Thomas T. Hoopes Prize, 2002.

Professional Activities

MIT BluePrint Labs (formerly seii), Founder and Director, 2012-.

Avela Education, Chief economist and co-founder, 2020-.

National Bureau of Economic Research, Founding Co-director, Working Group on Market Design, 2008-.

MIT Integrated Learning Initiative, Deputy Director, 2016-.

Associate Editor, *Journal of Political Economy*, 2016-2019; 2019-2022.

Editorial Board, *Education Finance and Policy*, 2014-2017; 2017-2019.

Associate Editor, *Econometrica*, 2013-2016.

Associate Editor, *American Economic Review*, 2012-2015; 2015-2017.

NSF Review Panel, 2012.

Boston Mayor Menino's Technical Advisor for Student Assignment Plan, Boston Public Schools, 2012.

Member of Scientific Board, Institute for Innovation in Public School Choice, 2007-2019.

Refereed Journal Publications

1. "Short Interest, Institutional Ownership, and Stock Returns." *Journal of Financial Economics*, November 2005, 78: 243-276. (with Paul Asquith and Jay Ritter)

2. "Leveling the Playing Field: Sincere and Sophisticated Players in the Boston Mechanism." *American Economic Review*, September 2008, 98(4), 1636-52. (with Tayfun Sönmez)

3. "Incentives and Stability in Large Two Sided Matching Markets." *American Economic Review*, June 2009, 99(3), 608-627. (with Fuhito Kojima)

4. "Strategyproofness versus Efficiency in Matching with Indifferences: Redesigning the NYC High School Match." *American Economic Review*, December 2009, 99(5): 1954-1978. (with Atila Abdulkadiroğlu and Alvin E. Roth)

5. "Unobserved Punishment Supports Cooperation." *Journal of Public Economics*, February 2010, 94(1-2): 78-86. (with Drew Fudenberg)

6. "Lotteries in Student Assignment: An Equivalence Result." *Theoretical Economics*, January 2011, 6(1): 1-17. (with Jay Sethuraman)

7. "Accountability and Flexibility in Public Schools: Evidence from Boston's Charters and Pilots." *Quarterly Journal of Economics*, May 2011, 126(2), 699-748. (with Atila Abdulkadiroğlu, Joshua D. Angrist, Susan M. Dynarski, and Thomas J. Kane)

8. "Cooperation over Finite Horizons: a Theory and Experiments." *Journal of Public Economics*, August 2011, 95(1-2), 500-512. (with Attila Ambrus)

9. "Forced Sales and House Prices." *American Economic Review*, August 2011, 101(5): 2108-2131. (with John Campbell and Stefano Giglio)

10. "Who Benefits from KIPP?" *Journal of Policy Analysis and Management*, Fall 2012, 31(4): 837-860. (with Joshua D. Angrist, Susan M. Dynarski, Thomas J. Kane, and Chris Walters)

11. "The Market for Borrowing Corporate Bonds." *Journal of Financial Economics*, January 2013, 107(1): 155-182. (with Andrea Au, Paul Asquith, Thomas Covert)

12. "School Admission's Reform in Chicago and England: Comparing Mechanisms by their Vulnerability to Manipulation." *American Economic Review*, February 2013, 103(1): 80-106. (with Tayfun Sönmez)

13. "Matching with Couples: Stability and Incentives in Large Markets." *Quarterly Journal of Economics*, October 2013, 128(4): 1585-1632. (with Fuhito Kojima and Alvin Roth)

14. "Explaining Charter School Effectiveness." *American Economic Journal: Applied Economics*, October 2013, 5(4): 1-27. (with Joshua D. Angrist and Christopher Walters)

15. "The Elite Illusion: Achievement Effects at Boston and New York Exam Schools." *Econometrica*, 2014, 82(1): 137-196. (with Atila Abdulkadiroğlu and Joshua D. Angrist)

16. "Housing Market Spillovers: Evidence from the End of Rent Control in Cambridge MA." *Journal of Political Economy*, June 2014, 122(3): 661-717. (with David H. Autor and Christopher J. Palmer)

17. "The Cost of Free Entry: An Empirical Study of Real Estate Agents in Greater Boston." *Rand Journal of Economics*, 46(1): 103-145, Spring 2015. (with Panle Jia Barwick)

18. "How Individual Preferences are Aggregated in Groups: An Experimental Study." *Journal of Public Economics*, 129(C): 1-13, September 2015. (with Attila Ambrus and Ben Greiner)

19. "Stand and Deliver: Effects of Boston's Charter High Schools." *Journal of Labor Economics*, 34(2), 275-318, 2016. (with Joshua D. Angrist, Sarah R. Cohodes, Susan M. Dynarski, and Christopher R. Walters)

20. "Charters without Lotteries: Testing Takeovers in New Orleans and Boston." *American Economic Review*, 106(7): 1878-1920, July 2016. (with Atila Abdulkadiroğlu, Josh Angrist, and Peter Hull)

21. "Leveraging Lotteries for School Value-Added: Testing and Estimation." *Quarterly Journal of Economics*, 132(2): 871-919, May 2017 (with Josh Angrist, Peter Hull, and Christopher Walters).

22. "Conflicts of Interest and the Realtor Commission Puzzle." *American Economic Journal-Applied Economics*, 132(2): 871-919, July 2017. (with Panle Jia Barwick and Maisy Wong).

23. "Research Design meets Market Design: Using Centralized Assignment for Impact Evaluation." *Econometrica*, September 2017, 85(5): 1373-1432. (with Atila Abdulkadiroğlu, Josh Angrist, and Yusuke Narita).

24. "The Welfare Effects of Coordinated School Assignment: Evidence from the NYC High School Match." *American Economic Review*, December 2017, 107(12): 3635-3689. (with Atila Abdulkadiroğlu and Nikhil Agarwal).

25. "Free to Choose: Can School Choice Reduce Student Achievement?" *American Economic Journal: Applied Economics*, January 2018, 10(1): 175-206. (with Atila Abdulkadiroğlu and Christopher Walters).

26. "Reserve Design: Unintended Consequences and The Demise of Boston's Walk Zones." *Journal of Political Economy*, December 2018, 126(6): 2457-2479 (with Umut Dur, Scott Kominers, and Tayfun Sönmez).

27. "How Well Do Structural Demand Models Work? Counterfactual Forecasting in School Choice." (with Peng Shi), November 2017, NBER Working Paper 24017, forthcoming, *Journal of Econometrics*, Special Issue in Honor of Dan McFadden.

28. "Do Parents Value School Effectiveness?" (with Atila Abdulkadiroğlu, Jon Schellenberg, and Chris Walters), *American Economic Review*, 2020, 110(5): 1502-1539.

29. "Explicit vs. Statistical Preferential Treatment in Affirmative Action: Theory and Evidence from Chicago's Exam Schools." (with Umut Dur and Tayfun Sönmez), *Journal of Economic Theory*, 2020, 187, 104996.

30. "Minimizing Justified Envy in School Choice: The Design of New Orleans OneApp." (with Atila Abdulkadiroğlu, Yeon-Koo Che, Alvin E. Roth, and Olivier Tercieux), *American Economic Review: Insights*, 2020, 2(4): 425-442.

31. "Improving Ventilator Rationing Through Collaboration with Experts on Resource Allocation." (with Tayfun Sönmez and M. Utku Ünver), JAMA Network Open, 2020; 3(6):e2012838.

32. "Covid-19: How to Prioritize Worse-off Populations in Allocating Safe and Effective Vaccines." (with Harald Schmidt, Tayfun Sönmez, and Utku Ünver), *British Medical Journal*, 2020; 371:m3795.

33. "The Distributional Consequences of Public School Choice." (with Chris Avery), *American Economic Review*, 2021, 111(1): 129-152.

34. "The Inefficiency of Race-Neutral Alternatives to Race-Based Affirmative Action: Evidence from Chicago's Exam Schools." (with Glenn Ellison), *American Economic Review*, 2021, 111(3): 943-975.

35. "Categorized Priority Systems: A New Tool for Fairly Allocating Scarce Medical Resources in the Face of Profound Social Inequities." (with Tayfun Sönmez (lead), M. Utku Ünver, Govind Persad, Robert D. Truog, and Douglas B. White), *CHEST Journal*, 159(3): 1294-1299, March 2021.

36. "Deduction Dilemmas: The Taiwan Assignment Mechanism." (with Umut Dur, Fei Song and Tayfun Sönmez), September 2018, NBER Working Paper 25024. forthcoming, *American Economic Journal: Microeconomics*.

37. "Breaking Ties: Regression Discontinuity Design meets Market Design." (with Atila Abdulkadirouglu, Josh Angrist, and Yusuke Narita), March 2019, forthcoming, *Econometrica*.

Other Publications

1. "The New York City High School Match." *American Economic Review, Papers & Proceedings*, May 2005, 364-367. (with Atila Abdulkadiroğlu and Alvin E. Roth)

2. "The Boston Public Schools Match." *American Economic Review, Papers & Proceedings*, May 2005, 368-371. (with Atila Abdulkadiroğlu, Alvin E. Roth, and Tayfun Sönmez)

3. "The Dynamics of Open-Source Contributors." *American Economic Review, Papers & Proceedings*, May 2006, 114-118. (with Josh Lerner and Jean Tirole)

4. "The Impact of Commissions on Home Sales in Greater Boston." *American Economic Review, Papers & Proceedings*, May 2010. (with Panle Jia)

5. "Inputs and Impacts in Charter Schools: KIPP Lynn." *American Economic Review, Papers & Proceedings*, 100(2), 239-243, May 2010. (with Joshua D. Angrist, Susan M. Dynarski, Thomas J. Kane, and Chris Walters)

6. "The Mechanism Design Approach to Student Assignment." *Annual Reviews of Economics*. Volume 3: 513-536, 2011.

7. Discussion of "The Missing One-Offs: The Hidden Supply of High-Achieving, Low-Income Students" by Chris Avery and Caroline Hoxby. *Brookings Papers on Economic Activity*, Spring 2013.

8. Discussion of "Evaluating Policies to Prevent Another Foreclosure Crisis" by Paul Willen. *Cato Papers on Public Policy*, Spring 2013.

9. "Interpreting Tests of School VAM Validity." *American Economic Review, Papers & Proceedings*, 106(5), 388-392, May 2016. (with Josh Angrist, Peter Hull, Christopher Walters)

10. "What Really Matters in Designing School Choice Mechanisms," in Bo Honore, Ariel Pakes, Monika Piazessi, Larry Samuelson, eds. *Advances in Economics and Econometrics, 11th World Congress of the Econometric Society*, Cambridge University Press, 2017.

11. "Regression Discontinuity in Serial Dictatorship: Achievement Effects at Chicago's Exam Schools." *American Economic Review, Papers & Proceedings*, 107(5), 240-245, May 2017. (with Atila Abdulkadiroğlu, Josh Angrist, Yusuke Narita, and Roman Zarate)

12. "Ending Rent Control Reduced Crime in Cambridge." *American Economic Review, Papers & Proceedings*, 109, 381-384, May 2019 (with David H. Autor and Christopher J. Palmer)

Working Papers and Work in Progress

1. "Simple and Credible Value-Added Estimating Using Centralized School Assignment." (with Josh Angrist, Peter Hull, and Christopher R. Walters), December 2020, NBER Working Paper 28241, Revise-and-resubmit, *Review of Economics and Statistics*.

2. "Mechanism Design meets Priority Design: Redesigning the US Army's Branching Process." (with Kyle Greenberg and Tayfun Sönmez), NBER Working Paper 28911, June 2021.

3. "The Long-Term Effects of Universal Preschool in Boston." (with Guthrie Gray-Lobe and Christopher R. Walters), NBER Working Paper 28756, May 2021, Revise-and-resubmit, *Quarterly Journal of Economics*.

4. "Fair Allocation of Vaccines, Ventilators, and Antiviral Treatments: Leaving No Ethical Value Behind in Health Care Rationing." (with Tayfun Sönmez, M. Utku Ünver, and M. Bumin Yenmez), NBER Working 26951, 2020.

5. "Rationing Safe and Effective COVID-19 Vaccines: Allocating to States Proportionate to Population May Undermine Commitments to Mitigating Health Disparities." (with Harald Schmidt, Michelle Williams, Tayfun Sönmez, M. Utku Unver, Lawrence Gostin), November 2020.

6. "What Prioritizing Worse-Off Minority Groups for COVID-19 Vaccines Means Quantitatively: Practical, Legal, and Ethical Implications." (with Harald Schmidt, M. Utku Ünver, Michelle Williams, Tayfun Sönmez, and Lawrence Gostin)

7. "Choice and Consequence: Assessing Mismatch at Chicago Exam Schools." (with Josh Angrist and Roman Zárate), August 2019, NBER Working Paper 26137, revised July 2020.

8. "Immigration Lottery Design: Engineered and Coincidental Consequences of H-1B Reforms." (with Alex Rees-Jones and Tayfun Sönmez), February 2020, NBER Working Paper 26767. Revise-and-resubmit, *Review of Economics and Statistics*.

9. "Reversing Reserves." (with Alex Rees-Jones and Tayfun Sonmez), April 2020, NBER Working Paper 26963 Revise-and-resubmit, *Management Science*.

10. "Paying it Backward and Forward: Expanding Access to Convalescent Plasma Therapy through Market Design." (with Scott D. Kominers, Tayfun Sönmez, M. Utku Unver), May 2020, NBER Working Paper 27143.

11. "Priority-Based Matching with a Social Objective: Contract Design for Access and Equity." (with Umut Dur, Arda Gitmez, and Tayfun Sönmez), March 2018.

12. "The Effects of Mandatory Transparency in Financial Market Design: Evidence from the Corporate Bond Market." (with Paul Asquith and Thomas Covert), NBER Working Paper 19417, September 2014, revised March 2019.

13. "The Economics of the Common Application." (with Chris Avery), March 2019.

14. "Optimal Curricula, Student Achievement, and the Regression Discontinuity Design." (with Glenn Ellison), April 2017.

Research Grants

W. T. Grant Foundation, "Understanding the Impact of Integration Policies in New York City Schools," 2020-2023.

Spencer Foundation, "Understanding the Impact of Integration Policies in New York City Public Schools," 2020-2022.

Walton Family Foundation, "Using Unified Enrollment Data to Grade School Effectiveness"' 2019-2022.

Walton Family Foundation, "The Impact of Boston Charters on Earnings: A Feasibility Study" 2019-2020.

The Michael and Susan Dell Foundation, "MIT School Access Fellows Program." 2019-2020.

Laura and John Arnold Foundation, "School Assignment and Accountability: Helping Policymakers Translate Student Assignment into School Effectiveness" 2018-2020.

Spencer Foundation, "Leveraging Lotteries for Value-Added," 2015-2017.

Walton Family Foundation, Post-doctoral support, 2016-2018.

William T. Grant Scholars Program, Early Career Award, 2015-2019.

MIT ESI Seed Grant, "Improved Management of Common Pool Resources: Water Market Design," 2015-2017.

National Science Foundation Research Grant, "Research Design meets Market Design," 2014-2017.

Laura and John Arnold Foundation, award to study affirmative action at Chicago Public Schools, 2014-2016.

National Science Foundation Research Grant, "Diversity and Transportation in School Choice," 2014-2016.

MIT-Chile Universidad Diego Portales Seed Fund, "Voucher Reform in Chile," 2014-2016.

Laura and John Arnold Foundation, award to study the New Orleans OneApp, 2013.

Boston Foundation - New Schools Venture Fund project on MA Charters, 2012-2013.

Institute for Education Sciences, Charter Schools; New Econometric Methods, 2012-2015.

National Science Foundation CAREER Research Grant, "From Assignment to Evaluation: The Design of School Choice Systems," Grant SES-1056325, 2011-2016.

National Science Foundation Research Grant, "Spillovers from Price Regulations: Evidence from Rent Control in Cambridge, MA" Grant SES-962572, 2010-2013.

Massachusetts Department of Elementary and Secondary Education contract to study charter Schools, 2009-10.

Harvard Real Estate Initiative Grant, 2010.

Lincoln Institute for Land Policy Research Grant, "Spillovers from Price Regulations: Evidence from Rent Control in Cambridge, Massachusetts," 2010.

Alfred P. Sloan Foundation Research Grant, "Spillovers from Price Regulations: Evidence from Rent Control in Cambridge, Massachusetts," 2009.

National Science Foundation Research Grant, "New Issues in Matching Market Design," Grant SES-924555, 2009-2012.

Harvard Milton Fund Research Grant, 2007.

Rappaport Institute for Greater Boston Fellow, 2007.

Q-Group Research Grant, 2006.

John R. Meyer Dissertation Fellowship, Joint Center for Housing Harvard, 2006.

Lincoln Institute for Land Economics Grant, 2005.

Spencer Foundation on Education Research Grant, 2005.

National Science Foundation Graduate Research Fellowship, 2003-2006.

Invited Plenary Talks

Plenary address, Stony Brook International Game Theory Conference, 2020.
Keynote speaker, Matching in Practice Workshop, Gothenberg, Sweden, 2019.
Keynote speaker, 2019 Asian Meeting of Econometric Society, Xiamen, China, 2019.
Keynote speaker, Economics of Markets and Organizations, Toronto, 2018.
Keynote speaker, 13th Conference on Web and Internet Economics, Bangalore, India 2017.
Keynote speaker, 10th Conference on Economic Design, in York, Society for Economic Design, 2017.
Social Choice and Welfare Economics Prize Lecture, Lund Sweden, 2016.
Frank Knight Memorial Lecture, Cornell University, 2016.
"What Really Matters in Designing School Choice Mechanisms," Invited lecture, 11th World Congress of the Econometric Society, Montreal, 2015.
"Econometrics of Matching," *Econometrics Journal Special Session*, Royal Economic Society, 2015.

Condorcet Lecture at Social Choice and Welfare Conference, 2014.
Lloyd Shapley Lecture for "distinguished game theorist aged 40 or under" at the World Congress of the Game Theory Society, Istanbul, 2012.
Keynote Speaker, ECORE Summer School on "Market Failure and Market Design," 2011.
Keynote Lecture, 15th Annual Coalition Theory Workshop in Marseilles, 2010.

Teaching

Graduate: Microeconomic Theory (PhD), Market and Mechanism Design (PhD), Labor Economics (PhD), Education Reform (MBA), Short-courses in Market Design (NBER, Hebrew University, ECARES, Princeton, AEAs)

Undergraduate: Microeconomic Theory, Market Design

Letter writer for the following PhD students, with initial placement (* indicates primary or secondary advisor):

1. Gabriel Carroll* ('12), Stanford Economics
2. Nikhil Agarwal* (Harvard '13), MIT Economics
3. Chris Walters* ('13), Berkeley Economics
4. Anton Kolotin ('13), University of New South Wales
5. Thomas Covert* (Harvard '14), Chicago Booth
6. Christopher J. Palmer* ('14), Berkeley Haas
7. Miikka Rokkanen* ('14), Columbia Economics
8. Weiwei Hu (Duke '14), Hong Kong University of Science and Technology, post-doc
9. Ankur Mani (Media Lab '14), University of Minnesota Industrial Engineering
10. Matt Weinberg (EECS '14), Princeton CS
11. Yusuke Narita* ('16), Yale Economics
12. Peng Shi* ('16), University of Southern California Marshall School of Business, OM group
13. Camille Terrier ('16 PSE), MIT post-doc → University of Lausanne
14. Peter Hull* ('17), University of Chicago Economics
15. Elizabeth Setren* ('17), Tufts Economics

16. Christos Tzamos (EECS '17), University of Wisconsin Madison CS
17. Alonso Bucarey* ('18), Amazon
18. Daniel Waldinger* ('18), New York University Economics
19. Fei Song* ('19), Facebook
20. Arda Gitmez* ('19), Post-doc Harris School University of Chicago, Bilkent University
21. Román Andrés Zárate* ('19), University of Toronto
22. Will Rafey* ('20), UCLA
23. Lorenzo Neri ('20 QMUL), University of St. Andrews
24. Clemence Idoux ('22)

9/2021

APPENDIX B – DOCUMENTS RELIED UPON

DOCUMENTS PRODUCED IN DISCOVERY

PX 1908
PX 208
PX 804
PX 815

[redacted] PX2305 [redacted]

EXPERT REPORTS

June 29, 2021 Expert Report of Fabio Savoldelli and Exhibits

June 29, 2021 Expert Report of Justin McCrary and Exhibits

June 29, 2021 Expert Report of Terrance Hendershott and Exhibits

June 29, 2021 Expert Report of William Pridmore and Exhibits

June 29, 2021 Export Report of Fabio Savoldelli and Exhibits

February 23, 2021 Opening Report of Paul Asquith and Parag Pathak and Exhibits

February 23, 2021 Opening Report of Haoxiang Zhu and Exhibits

October 5, 2021 Reply Report of Haoxiang Zhu

DEPOSTIONS AND DECLARATIONS

September 3, 2021 Deposition of Justin McCrary and Exhibits

May 5, 2021 Deposition of Parag Pathak

May 14, 2021 Deposition of Paul Asquith

December 18, 2019 Deposition of [redacted]

February 13, 2020 Deposition of [redacted]

February 28, 2020 Deposition of [redacted]
September 17, 2020 Deposition of [redacted]
October 16, 2020 Deposition of [redacted]
September 15, 2020 Deposition of [redacted]
October 21, 2020 Deposition of [redacted]
August 21, 2020 Deposition of [redacted]
October 15, 2020 Deposition of [redacted]
August 20, 2021 Deposition of [redacted]
August 27, 2021 Deposition of [redacted]
May 27, 2021 Declaration of [redacted]
June 10, 2021 Declaration of [redacted]
June 17, 2021 Declaration of [redacted]
October 5, 2021 Declaration of [redacted]

CASE FILINGS
November 17, 2017 Amended Complaint

DEFENDANT DATA CORRESPONDENCE
[redacted] to D. Mach, August 10, 2021
[redacted] to D. Mach, April 16, 2021
[redacted] to D. Mach, March 16, 2021
Email from [redacted] to D. Fisher, July 16, 2021
Email from [redacted] to C. Bateman, February 8, 2021
Email from [redacted] to D. Fisher, November 23, 2020
Email from [redacted] to D. Fisher, September 11, 2020
Email from [redacted] to A. Mollard, May 13, 2020
[redacted] to D. Fisher, April 27, 2020
[redacted] to D. Fisher, November 23, 2020
[redacted] to D. Fisher, September 11, 2020
[redacted] to D. Mach, August 10, 2021
[redacted] to D. Mach, July 2, 2021
[redacted]) to R. Cobbs, November 17, 2020
[redacted] to R. Cobbs. July 10, 2020
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[redacted] to R. Cobbs, August 28, 2021
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[redacted] to R. Cobbs, March 15, 2021
[redacted] to R. Cobbs, October 8, 2020
[redacted] to D. Mach, July 3, 2020
[redacted] to D. Brockett, September 28, 2021
[redacted] to A. Mollard, May 15, 2020
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ACADEMIC AND RESEARCH ARTICLES

Yule, G. Udny, "Measures of Dispersion, Etc." An Introduction to the Theory of Statistics, 6th Ed. Enl., 133–56, at 133, London: Charles Griffin & Co. doi:10.1037/13554-008 (1922)

Bassler, Peter and Ed Oliver, "Securities Lending Best Practices: A Guidance Paper for Institutional Investors," Securities Finance Trust Company, 2015

"Borrowing Stock in 2011: Agent Lenders on Prime Brokers in Equity Securities Lending", Finandium, December 2011

Hedges IV, James R. "Hedge fund transparency." The European Journal of Finance 11.5 (2005): 411-417

"Resetting the Roadmap: Managing in a New Securities Lending Environment for Beneficial Asset Holders," Finandium, Third Quarter 2009

ONLINE SOURCES

"The A-Z Guide to ALD", SIFMA, December 7, 2006, available at http://www.sifma.org/resources/general/agency-lending-disclosure"

"Inside One Of the Most Secretive And Successful Hedge Funds In The World," Benzinga News, available at https://www.benzinga.com/news/16/11/8724328/inside-one-of-the-most-secretive-and-successful-hedge-funds-in-the-world

"Short Sale Position and Transaction Reporting," Securities and Exchange Commission, June 5, 2014

"The Next Evolution of Electronic Repo Trading for the Sell-side and the Buy-side," Finandium, September 19, 2019, available at https://finadium.com/the-next-evolution-of-electronic-repo-trading-for-the-sell-side-and-buy-side/

"US Beneficial owners roundtable," Global Investor Group, March 4, 2015, available at https://www.globalinvestorgroup.com/articles/3432952/us-beneficial-owners-roundtable

"What Went Wrong at AIG?", available at https://insight.kellogg.northwestern.edu/article/what-went-wrong-at-aig

Appendix A, Treasury, available at https://home.treasury.gov/system/files/261/here.pdf

Basel Committee on Banking Supervision reforms - Basel III, Pillar 1, available at https://www.bis.org/bcbs/basel3/b3summarytable.pdf

Calculation of RWA for Credit Risk, BIS, available at https://www.bis.org/basel_framework/chapter/CRE/52.htm

Cash Interest Pass-Through Program - FAQ, CME Group, available at https://www.cmegroup.com/clearing/financial-and-collateral-management/files/interest-pass-through-rate-faq.pdf

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https://www.dtcc.com/-/media/Files/Downloads/Clearing-Services/SFT-Clearing-Service-Fact-Sheet.pdf

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https://www.nyse.com/publicdocs/nyse/data/Daily_Short_Volume_Client_Spec_v1.3.pdf

India National Stock Exchange, Securities Lending & Borrowing Mechanism (SLBM) Brochure available at https://www1.nseindia.com/invest/content/SLB_brochure.pdf

Interest Rate on Excess Reserves, FRED, available at https://fred.stlouisfed.org/series/IOER

Investment News: "Image repair: Mutual funds still recovering 10 years after scandal", available at https://www.investmentnews.com/image-repair-mutual-funds-still-recovering-10-years-after-scandal-53614

James Chen, "Iceberg Order," Investopedia, available at https://www.investopedia.com/terms/i/icebergorder.asp

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Rules and Procedures, National Securities Clearing Corporation, available at https://www.dtcc.com/~/media/Files/Downloads/legal/rules/nscc_rules.pdf

UBS AG Annual Report 2012

UBS Securities LLC Form CRS, June 30, 2020, available at https://files.brokercheck.finra.org/crs_7654.pdf

UBS Securities LLC, available at https://www.bloomberg.com/profile/company/5766Z:US

REGULATORY AND INDUSTRY LITERATURE

12 C.F.R. § 217.35(a)

12 C.F.R. § 217.35(c)(3)

12 CFR § 217.37

17 C.F.R. § 240.17Ad-22

U.S. Securities and Exchange Commissions, Release No. 76899, File No. 3-17053, January 14, 2016

"Equities as Collateral in U.S. Securities Lending Transactions," A Study Implemented by the RMA Executive Committee on Securities Lending, March 2011

"Prime Broker Pressures, Identifying and alleviating the tensions in the manager-prime relationship", HFM Insights, September 2017

"Prime Brokerage Survey," Global Custodian, 2017

"The Multi-Prime Broker Environment, Overcoming Challenges and Reaping the Benefits," Merrill Lynch Global Markets & Investment Banking Group, March 2007

"UBS Prime Brokerage Services: Presentation for KKR Asset Management LLC," Not Dated

Bassler, Peter and Ed Oliver, "Securities Lending Best Practices: A Guidance Paper for Institutional Investors," Securities Finance Trust Company, 2015

Prime Broker Pressures, HFM, September 2017

Risk Management Association, "Equities as Collateral in U.S. Securities Lending Transactions," A Study Implemented by the RMA Executive Committee on Securities Lending, March 2011

U.S. Securities and Exchange Commissions, Release No. 76899, File No. 3-17053, January 14, 2016

APPENDIX C – TECHNICAL APPENDIX

1. In this section we describe the steps we have taken to supplement the transactions data we examined in our Opening Report with the other data sources. We discuss adjustments we have made since our Opening Report to our Prime Broker Transactions Datasets[456] and our Pooled Prime Broker Dataset,[457] which included data from [redacted] (for our Opening Report) and for this report, add data from [redacted] Together we refer to these datasets as our "Updated Prime Broker Transactions Datasets" and our "Updated Pooled Prime Broker Dataset." We also discuss data issues raised by Dr. McCrary including U.S. versus non-U.S. transactions, funding trades, outliers, purported class members that benefitted from the conspiracy and gross-up calculations that address weekends, damages from January 1, 2018, and unmatched transactions Level 1 and Level 2 transactions.

2. We next describe the datasets we have analyzed since our Opening Report for the Named Plaintiffs (IPERS, LACERA, OPERS, SCERA and Torus), Locate data produced by certain Prime Broker Defendants and [redacted] data. Lastly, we discuss the additional [redacted] Stock Loan transaction records we have analyzed since our Opening Report. We update certain tables from our Opening Report to demonstrate that the inclusion of these additional records does not affect our determination of the value of "w".

A. Prime Broker Defendant Data Production

3. In this report we supplement the transactions data we examined in our Opening Report with the data from [redacted] For the sake of argument and to minimize differences of opinion pertaining to small differences in the transactions analyzed by Dr. McCrary and us, we have reviewed Dr. McCrary's builds of the data, and where appropriate, relied upon his builds of stock loan transactions for this report after converting his data from his programming languages, (R and SQL), into ours, SAS.[458] There were instances where it was necessary to make corrections to his data, and accordingly, some differences exist between his compilations of stock loan transactions and ours. In the section below, we discuss

[456] Opening Report ¶ 379.
[457] Opening Report ¶ 394.
[458] In performing these data conversions, we were unable to exactly replicate the data produced as backup to the McCrary Report. However, as we describe below, the replication discrepancies are small relative to the total number of observations.

the Level 1 and Level 2 data produced by each Prime Broker Defendant and analyzed by Dr. McCrary, and describe the differences, if any, that remain between his data builds and ours.

1. [redacted]

4. For purposes of this report, we rely on the incorporation of additional records from Dr. McCrary's [redacted] and [redacted] datasets for [redacted] and his construction of these data. Dr. McCrary asserts that certain records in the [redacted] were duplicative and not removed from the dataset we used for our Opening Report.[459] We have determined that we have no basis to reject the exclusion of these purportedly duplicative transactions. The removal of these transactions affects [redacted] and [redacted] of the [redacted] data included in our Opening Report.

EXHIBIT C.1
ADJUSTMENTS MADE TO THE [redacted]
IN THE OPENING REPORT

[redacted]

5. Dr. McCrary also describes adjustments to the [redacted] data from our Opening Report, specifically, removing "[redacted]" records in the [redacted][460] We agree with this adjustment. Dr. McCrary also makes adjustments to the [redacted] dataset where "[redacted]"[461] To make this adjustment, Dr. McCrary relies upon a crosswalk of [redacted][462] We note that as regards these IDs, "[redacted]" meaning "[redacted]"[463] Dr. McCrary has assumed it is

[459] McCrary Report, Appendix C, ¶ 36.
[460] McCrary Report, Appendix C, ¶ 35.
[461] Email from [redacted] to A. Mollard (counsel for plaintiffs), May 13, 2020.
[462] *See* [redacted]
[463] McCrary Report, Appendix C, ¶ 37.

appropriate to match anonymized account IDs contained in the crosswalk to a matching sequence of numbers in the anonymized account IDs contained in the [redacted] data file (i.e., anonymized account ID "[redacted]" in [redacted] corresponds to anonymized account ID "[redacted]" in the crosswalk) and removes records that are purportedly duplicative with the [redacted] production. We agree with the reasonableness of this assumption to the extent it appropriately eliminates additional parent/child duplicative records. The above adjustments to the [redacted] data have [redacted] and the [redacted]

EXHIBIT C.2
ADJUSTMENTS MADE TO THE [redacted]
IN THE OPENING REPORT

[redacted]

2. [redacted]

6. We note there are no significant differences between the [redacted] data builds reflected in our Opening Report and those of Dr. McCrary. His data build includes an additional [redacted] from the [redacted] dataset which represents [redacted][464] of which [redacted] or [redacted] are ultimately incorporated into our Updated Prime Broker Transactions Datasets after applying the record exclusion rules we discussed in our Opening Report.[465]

[464] McCrary Report, Appendix C, ¶ 45.
[465] Opening Report ¶¶ 360-379.

EXHIBIT C.3
ADJUSTMENTS MADE TO THE [redacted]
IN THE OPENING REPORT

[redacted]

7. We also note Dr. McCrary does not make any adjustments to the [redacted] data used in our Opening Report.

EXHIBIT C.4
NO ADJUSTMENTS WERE MADE TO THE [redacted]
USED IN THE OPENING REPORT

[redacted]

3. [redacted]

8. For this report, we incorporate additional records from Dr. McCrary's [redacted] and [redacted] datasets. [redacted] represents its supplemental data production comprises [redacted][466] and [redacted][467] [redacted][468] we chose not to process these data sources.[469] Dr. McCrary chose to process these records and then apply the data clean-up and other exclusions discussed in our Opening Report.[470] For the sake of argument we have decided to incorporate these records and his data builds after

[466] [redacted] Letter to R. Cobbs (counsel for plaintiffs), July 10, 2020.
[467] [redacted] Letter to R. Cobbs (counsel for plaintiffs), November 17, 2020.
[468] Opening Report ¶¶ 360-379.
[469] Opening Report ¶ 358.
[470] Opening Report ¶¶ 360-379.

performing our testing of these records. We note that since most of the records in the supplementary data production involve [redacted] The addition of supplementary data adds [redacted][471]

9. Dr. McCrary's data production excluded certain fields from the [redacted] data. Specifically, Dr. McCrary's production of [redacted] data dropped the field "[redacted]" which [redacted] For exhibits related to [redacted] recall rates we have appended the "[redacted]" field to the [redacted] data. The "[redacted]" field is [redacted] Further, because records in Dr. McCrary's Level 1 data are sourced predominately from the [redacted] file we have limited our analysis of [redacted] recalls to records sourced from that dataset.

EXHIBIT C.5
ADJUSTMENTS MADE TO THE [redacted]
IN THE OPENING REPORT

[redacted]

10. We note Dr. McCrary does not make any adjustments to the [redacted] data used in our Opening Report.

[471] McCrary Report, Appendix C, ¶ 40.

EXHIBIT C.6
NO ADJUSTMENTS WERE MADE TO THE [redacted]
DATA USED IN THE OPENING REPORT

[redacted]

4. [redacted]

11. We have performed a review of Dr. McCrary's [redacted] and [redacted] data builds for [redacted] Unlike [redacted] who provided us with [redacted][472] [redacted] data production is [redacted] (In fact, [redacted][473]) [redacted][474] [redacted][475] [redacted] data were constructed by Dr. McCrary using [redacted] As we discuss in Technical Appendix C, Subsection B.3 below, [redacted] Dr. McCrary has noted similar difficulties, concluding that [redacted][476] Additionally, Dr. McCrary drops "[redacted]" which he defines as [redacted]

[472] Opening Report, Appendix C, ¶¶ 19-20.
[473] For example, see, [redacted] with Excel tab labeled "[redacted]". This file was [redacted].
[474] Email from [redacted] to R. Cobbs (counsel for plaintiffs), October 8, 2020, at 2.
[475] Email from [redacted] to R. Cobbs (counsel for plaintiffs), October 8, 2020, at 2.
[476] McCrary Report, Appendix C, ¶ 23.

[477] Our own exploration of the data suggests these "[redacted]" comprise [redacted] Notably, Dr. McCrary's removal of "[redacted]" occurs as an "[redacted]" distinct from [redacted][478] In other words, the data produced by [redacted] was [redacted] We have analyzed Dr. McCrary's data builds, and while we currently use his construction of this data set, our analysis of certain of the records has raised certain questions and we reserve the right to supplement our analysis of the [redacted] data in connection with our merits report.

12. We have also performed a review of Dr. McCrary's [redacted] data for [redacted] which [redacted][479] [redacted][480] Dr. McCrary has chosen to rely upon the [redacted] data but dismisses the [redacted] data, stating: "[redacted]"[481]

13. Our review of [redacted] data confirms that prior to September 2016 the data [redacted] However, from September 2016 through December 2017 the [redacted] In correspondence dated August 5, 2021, [redacted] indicated that "[redacted]"[482] We believe the exclusion of all [redacted] records by Dr. McCrary is improper and have supplemented his [redacted] data to include [redacted] records from September 2016 through December 2017. In processing the EQS records we have followed the same data cleaning approaches as described in our Opening Report.

[477] McCrary Report, Appendix C, ¶ 23.
[478] McCrary Report, Appendix C, ¶ 21-22.
[479] [redacted] Letter to Robert Cobbs (counsel for plaintiffs), August 28, 2020.
[480] [redacted] Letter to Robert Cobbs (counsel for plaintiffs), October 8, 2020, p 3.
[481] McCrary Report, Appendix C, ¶ 8.
[482] [redacted] Letter to Robert Cobbs (counsel for plaintiffs), August 5, 2021, p. 5.

EXHIBIT C.7
SUMMARY OF EQS FILES PRODUCED BY [redacted]

EXHIBIT C.8
EFFECT OF CORRECTIONS TO [redacted]

5. [redacted]

14. We have performed a review of Dr. McCrary's [redacted] and [redacted] data builds for [redacted] and have made the following adjustments to his data.

15. The [redacted] includes [redacted][483] Through correspondence, [redacted] indicated [redacted] indicated [redacted][484] Dr. McCrary has processed [redacted] data in a manner consistent with this guidance. However, our review of his data build indicates this guidance results in [redacted]

16. We first note that [redacted]

[483] [redacted] Letter to D. Mach (counsel for plaintiffs), August 10, 2021.
[484] [redacted] Letter to D. Mach (counsel for plaintiffs), July 3, 2020, p 4.

[redacted]

EXHIBIT C.9
DEFENDANT PRIME BROKER PERCENT OF NON-CASH COLLATERAL

[redacted]

Notes: McCrary Report Transaction Base Sample.

17. We examined [redacted]

EXHIBIT C.10
CORRELATION BETWEEN NON-CASH COLLATERAL LOAN COST
AND THE FED OPEN/OBFR BENCHMARK SERIES

[redacted]

Notes: McCrary Report Transaction Base Sample. Correlation coefficients are all statistically significant with a P-value of 0.0001 or lower.

18. We also compared the [redacted] As described in our Opening Report and consistent with the industry practice, Hot securities reflect scarcity and should have loan prices that exceed prices for GC securities. [redacted]

EXHIBIT C.11
MEDIAN VALUE OF LOAN COSTS (BPS) FOR GC AND HOT STOCKS BY DEFENDANT
CASH AND NON-CASH COLLATERALIZED TRANSACTIONS

[redacted]

Notes: McCrary Report Transaction Base Sample.

19. For these reasons we do not fully accept all the [redacted] transactions reflected in Dr. McCrary's data builds, and exclude [redacted]

[redacted] In removing these records, we also recalculate the outlier thresholds for loan costs and notional values using only cash collateralized transactions.[485]

20. Taken together, these corrections to Dr. McCrary's processing of [redacted]

EXHIBIT C.12
EFFECT OF CORRECTIONS TO [redacted] LEVEL 1 DATA

[redacted]

21. The [redacted] data used in the McCrary Report also errs in the application of the benchmark rate. Dr. McCrary uses an improper OBFR rate in his Level 1 dataset starting September 16, 2016, which results in an erroneous measure of the loan cost. Our review of the data indicates that [redacted][486]

22. The [redacted] production reflects [redacted] Correspondence with [redacted] confirmed [redacted][487] The [redacted] also has [redacted] Correspondence with

[485] To reconstruct the [redacted] data, we replicated the coding logic used for the McCrary Report. However, our reconstruction of Dr. McCrary's dataset excluded [redacted] the McCrary Report would have kept. We chose to reintroduce those observations, after removing non-cash collateral records, and include them as part of the [redacted] data analyzed in this report.

[486] An OBFR rate change is not published until the open of the market on the following trading day at 9 AM. Conversely, the Fed Open rate is published at 4:15 PM on the same date that it changes. Thus, assuming the rate changes on September 15, the Fed Open rate could be applied to the [redacted] data as early as September 16. But since the OBFR September 15 rate change is not published until the market open on September 16, the earliest it could be applied is to stock position on September 17, a two-day lag.

[487] [redacted] Letter to D. Mach (counsel for plaintiffs), April 16, 2021.

Defendant [redacted] also confirmed [redacted][488]

23. As such, our damages computation includes [redacted] We discussed this regression in Section IV.B.1.

6. [redacted]

24. As explained in our Opening Report, [redacted] produced [redacted] and [redacted] data. We have inspected Dr. McCrary's builds of the [redacted] data and made no adjustments to his data.

25. [redacted][489] In Section IV.A we explained why we believe it is inappropriate to include "[redacted]" records and "[redacted]" records from our data builds and calculation of damages. Since we exclude these records, we also recalculate our outlier thresholds for loan costs and notional values.[490] Removal of these records eliminates [redacted] of records and [redacted] included in the [redacted] data relied upon by Dr. McCrary.

EXHIBIT C.13
EFFECT OF CORRECTIONS TO [redacted] L2 DATA

[redacted]

7. Updated Prime Broker Transactions Datasets and Updated Pooled Prime Broker Data

26. The tables below provide updated record counts, notional values and loan costs associated with the data for all six Prime Broker Defendants reflected in our "Updated Prime Broker Transactions Datasets" and "Updated Pooled Prime Broker Data." The table below

[488] [redacted] Letter to D. Mach (counsel for plaintiffs), April 16, 2021.
[489] McCrary Report Appendix C 18.
[490] To reconstruct the [redacted] data, we replicated the coding logic used for the McCrary Report. However, our reconstruction of Dr. McCrary's dataset included [redacted] the McCrary Report would have dropped. Similar to our methodology for [redacted] we kept observations we could not replicate so long as they were not associated with "[redacted]" or "[redacted]" transactions.

updates Table XI.6 from our Opening Report and provides a summary of the matched and unmatched records for the period 2012 to 2017 as reflected in our Updated Pooled Prime Broker Dataset.

EXHIBIT C.14
COUNTS AND NOTIONAL AMOUNTS
FOR MATCHED AND UNMATCHED CUSIP-DAYS

Notes: Updated Pooled Prime Broker Dataset.

27. The table below computes damages for [redacted] after accounting for the four categories of gross-up adjustments discussed in Section IV.B. We also list the number of undamaged class member accounts.

EXHIBIT C.15
DAMAGES FOR EACH SUBCLASS BY DEFENDANT
WITH ADJUSTMENTS FOR MISSING [redacted] UNMATCHED DAYS, WEEKENDS

[redacted]

Notes: Updated Prime Broker Transactions Datasets. For the Beneficial Owner Subclass and End-User Subclass, we are assuming an F_s of [redacted] and [redacted] respectively.

8. Computation of Damages Using Opening Report Methodology

28. In the exhibit below, we provide an estimate of damages using our Updated Pooled Prime Broker Dataset and Update Prime Broker Transactions Datasets, but incorporating the model assumptions from our Opening Report, that is, $\max(F_{otc}, F_s) =$ [redacted] at both the borrow and lend side of each transaction plus F_p. Our computation below also reflects adjustments for [redacted] weekends, unmatched transactions and an estimate for damages for the period January 1, 2018 through the date of our Opening Report.

29. Our estimate of damages under this methodology for the period January 1, 2012, through December 31, 2017, is [redacted] for the **Beneficial Owners Subclass** and [redacted] for the **End-User Subclass** for a total of [redacted] This calculation of damages is *prior* to adjustments for weekends, unmatched transactions, [redacted] and an estimate for damages for the period January 1, 2018, to the present.[491] As shown below, under this method, [redacted] of the Beneficial Owner Subclass accounts were undamaged and [redacted] of the End-User Subclass accounts were undamaged.

30. Our estimate of damages through the date of our Opening Report including adjustments for [redacted], unmatched transactions and

[491] Opening Report ¶¶ 520, 537-540.

missing weekends is [redacted] for the **Beneficial Owners Subclass** and [redacted] for the **End-User Subclass** for a total of [redacted]

EXHIBIT C.16
DAMAGES FOR EACH SUBCLASS THROUGH DATE OF REPORT
OPENING REPORT ASSUMPTIONS
WITH ADJUSTMENTS FOR MISSING [redacted] UNMATCHED DAYS, WEEKENDS

[redacted]

Notes: Updated Prime Broker Transactions Datasets. For the Beneficial Owner Subclass and End-User Subclass, we are assuming F_s of [redacted]

B. Data Issues Raised by Defendants

31. Dr. McCrary has made additional data criticisms of our Prime Broker Transactions Datasets and Pooled Prime Broker Data. Our response to these criticisms appears below. Nothing in the points raised by Dr. McCrary has caused us to alter our methodology from our Opening Report.

1. Identifying U.S Versus Non-U.S. Transactions

32. Dr. McCrary speculates that because our identification of transactions with a nexus to U.S. commerce may not reflect the location of the transaction, such as the trading desk, our data can [redacted][492] He then opines that [redacted][493] But despite pointing out

[492] McCrary Report ¶ 216.
[493] McCrary Report ¶ 217.

this flaw [redacted] Dr. McCrary makes no attempt to quantify the impact of this purported flaw or suggest any remedy.

33. As explained in our Opening Report, we have relied upon the representations of the Defendants about their data to ascertain, with reasonable certainty, whether a transaction has a nexus to U.S. commerce. The Defendants' representations generally indicate [redacted] For example, the [redacted] letters cited by Dr. McCrary note that while the [redacted] data does "[redacted]"[494] and that "[redacted]"[495]

34. Continuing with the example of [redacted] our efforts to identify transactions with a nexus to U.S. commerce therefore included incorporating only transactions from [redacted] and excluding transactions from [redacted] and then applying a second filter to strengthen our inference to U.S. commerce by limiting our datasets to lending and borrowing transactions involving a listing on a U.S. stock exchange, as determined using the CRSP stock database.[496]

35. We note now, as we noted at the time of our Opening Report, that the [redacted] letters describing its data production stated that "[redacted]"[497] And it was because the Defendants, such as [redacted] were [redacted] that we applied our two-step filter, which we contend is still appropriate: first, selecting transactions conducted with a U.S. Prime Broker Defendant counterparty [redacted]

[494] Letter from [redacted] to D. Mach (counsel for plaintiffs), July 2, 2020, p. 5.
[495] Letter from [redacted] to D. Mach (counsel for plaintiffs), July 2, 2020, p. 5.
[496] Opening Report ¶ 368.
[497] Letter from [redacted] to D. Mach (counsel for plaintiffs), July 2, 2020, p. 5.

[redacted] and second, applying a CRSP filter to ensure that we could provide reasonable assurance that our Prime Broker Transactions Datasets include transactions with a connection to U.S. commerce.

2. Funding Trades

36. Dr. McCrary asserts that our filter to exclude funding transactions is unlikely to remove all such trades because we utilized a price filter that fails to consider the "[redacted]"[498] He seems to suggest that we must use a "purpose" filter because we cited to deposition testimony for one deponent that indicates that [redacted] On this basis, Dr. McCrary argues that individualized inquiry is necessary to determine purpose.[499]

37. But Dr. McCrary, other than making this one point, provides no empirical analysis to indicate that our price filter is flawed and not a valid method to identify financing transactions. In fact, our price method for identifying funding trades is based on representations by the Defendants. For example, we cited to a letter in our Opening Report from Defendant [redacted] which represented that [redacted][500] To suggest our price methodology is flawed indicates that Dr. McCrary does not understand the economics of a funding trade or the representations of the Defendants. We also note he misrepresents our methodology. As explained in our Opening Report, we first relied upon correspondence from the Prime Broker Defendants to understand whether their production included or excluded funding trades. Then we applied a second price filter based to exclude transactions that had a zero or negative loan cost on the first day of the stock loan.

3. Stock Loans with Negative OTC Spreads

38. Dr. McCrary has challenged our supply-demand framework and its prediction of but-for world platform prices on the basis our platform price sometimes lies outside the range of actual prices on a CUSIP-Day. He opines that "[i]n some cases, it would be mathematically

[498] McCrary Report ¶ 223.
[499] McCrary Report ¶ 223.
[500] Opening Report, ¶ 366 n.424.

impossible for the but-for platform price to be inside the range defined by the actual OTC prices because the [redacted] the average [redacted][501]

39. As noted in our Opening Report, the [redacted] However, Dr. McCrary is wrong to suggest that this phenomenon is consistent with a fallacy in our model.

40. Stock loan spreads can become negative for a variety of reasons. As we explained in our Opening Report, a negative spread can occur because of movements in loan cost within a day or across days.[502] It can result from pricing errors made by the Defendants that may go uncorrected.[503] It can also occur given the bifurcated structure of the OTC market with search frictions and a lack of pricing transparency (as described in Section II.C.).

41. Moreover, [redacted] For [redacted] This result is attributable to [redacted] The data

[501] McCrary Report ¶ 144.
[502] Opening Report ¶¶ 407-411.
[503] As an example, in [redacted] asks [redacted] about [redacted] notes that it "[redacted]" In other words, [redacted] This exchange indicates that there are some instances where stock loans are established at price levels that are inaccurate. *See* "[redacted]" July 13, 2015, [redacted] at '9365.

construction challenges and the removal of a significant number of records from this dataset are discussed above in Appendix C, Subsection A.4.

42. [redacted]

4. Outliers

43. Dr. McCrary speculates that our outlier filter at the 0.5 percentile is arbitrary and "may misclassify some valid transactions as errors and misclassify some errors as valid transactions." He then muses about another value we could have chosen.[504]

44. But musing is not evidence and Dr. McCrary provides no empirical analysis to demonstrate that our filter is flawed and may improperly exclude anomalous transactions. Nor does he provide any evidence that our outlier threshold should be set to a different threshold. We conservatively apply an outlier filter to address potential data errors or anomalies that can occur in any large dataset. And just because we remove outliers for purposes of developing our economic model and estimating some of the named plaintiff damages does not mean that the damages suffered by an individual claimant arising from such outliers would necessarily be denied when ultimately computing the damages for this entity.

5. Defendants' Experts Claims That Our Damages Include Entities That May Have Benefitted from the Conspiracy

45. Dr. McCrary asserts that certain non-defendant prime brokers would have benefitted from the conspiracy because they have economic interests that differ from the rest of the class. We note that if this court determines that certain class members should be excluded from our calculation of damages, our model is capable of making these adjustments.

[504] McCrary Report ¶ 224.

6. Gross-up Calculations

46. Dr. McCrary challenges our methodology for computing damages for the period beyond December 31, 2017 because we assume harm for class member transactions during this period[505] since [redacted]

47. We continue to believe our method for estimating damages is reasonable until [redacted] In our Opening Report we provided evidence that Global Securities Lending Revenues for 2018 and 2019 were higher than lending revenues in any year in the Data Period.[506]

C. Named Plaintiff Transactions Data

1. IPERS Transactions Data

48. [redacted]

EXHIBIT C.17
SUMMARY OF DATA FILES PRODUCED BY IPERS

[redacted]

[505] McCrary Report ¶¶ 197-200.
[506] Opening Report ¶ 534.

EXHIBIT C.18
COUNT OF RECORDS AND TIME PERIOD
FOR DATA FILES PRODUCED BY IPERS

[redacted]

49. [redacted]

EXHIBIT C.19
SUMMARY OF IPERS TRANSACTIONS DATA

[redacted]

2. LACERA Transactions Data

50. [redacted]

EXHIBIT C.20
SUMMARY OF DATA FILES PRODUCED BY LACERA

[redacted]

EXHIBIT C.21
COUNT OF RECORDS AND TIME PERIOD
FOR DATA FILES PRODUCED BY LACERA

[redacted]

51. [redacted]

[redacted]

507 [redacted]

EXHIBIT C.22
SUMMARY OF LACERA TRANSACTIONS DATA

[redacted]

3. OCERS Transactions Data

52. [redacted]

EXHIBIT C.23
SUMMARY OF DATA FILES PRODUCED BY OCERS

[redacted]

EXHIBIT C.24
COUNT OF RECORDS AND TIME PERIOD
FOR DATA FILES PRODUCED BY OCERS

[redacted]

53. [redacted]

EXHIBIT C.25
SUMMARY OF OCERS TRANSACTIONS DATA

[redacted]

4. SCERA (Level 1) Transactions Data

54. [redacted]

[508] McCrary Report, Appendix C, ¶¶ 61-69.

[redacted]

EXHIBIT C.26
SUMMARY OF SCERA (LEVEL 1) TRANSACTIONS DATA
[redacted]

5. Torus and SCERA Transactions data (Level 2)

55. [redacted]

D. [redacted]

56. For purposes of this report, we have relied upon the [redacted] included in the backup materials to the McCrary Report. The Locate data were constructed from data provided by [redacted] The [redacted] was not utilized by Dr. McCrary because it contained [redacted][510] The construction of this data is described in McCrary Report Appendix C.[511]

E. [redacted]

57. For the purposes of this report, we have relied upon the [redacted] dataset produced in the backup materials to the McCrary Report. The steps undertaken to process these data are described in the McCrary Report Appendix C.[512]

[509] [redacted] Letter to A. Mollard, May 15, 2020, Appendix B and [redacted]
[510] McCrary Report, Appendix C, ¶ 73.
[511] McCrary Report, Appendix C, ¶¶ 70-90.
[512] McCrary Report, Appendix C, ¶¶ 54-60.

F. [redacted] Data and *w* Values

58. Dr. McCrary observed that in our processing of [redacted] data we did not import [redacted] Since the issuance of our Opening Report, we have also incorporated data from [redacted] which would affect prior analyses we performed that compared [redacted] prices to dealer-intermediated prices and analyses pertaining to our determination of the value for *w*. Exhibit C.27 below shows that the incorporation of these transactions adds [redacted] As with our Opening Report, the figures presented below [redacted][513] [redacted]

EXHIBIT C.27
SUMMARY OF ADJUSTMENTS TO [redacted] STOCK LOAN BILLING RECORDS

[redacted]

Source: Updated [redacted] Dataset, borrow transactions.

59. In our Opening Report we prepared analyses that compared the market clearing platform price of each [redacted] stock loan transaction to its match in the Prime Broker Defendant Dataset, which, at that time, included [redacted] We prepared two charts that compared the [redacted] market clearing platform price to [redacted] and [redacted]

[513] With the additional [redacted] added to our dataset, we noted that [redacted]

and two additional charts that compared the [redacted] market clearing platform price to [redacted] and [redacted] We studied the pricing relationship between the platform execution prices and OTC prices because we were interested in determining how often we could observe [redacted]

60. Dr. McCrary notes that [redacted][514] However, [redacted] As we show in the beginning of Section IV, [redacted]

61. Below we update table XI.15 from our Opening Report. This table provided us with different estimates of *w*, which is the variable we use to estimate where in the range of OTC prices at Level 1 (P_1) and Level 2 (P_2), the market-clearing platform price (P_p) will fall. **Exhibit C.28** presents our updated results. In this Table, as in our Opening Report, we derived different measures of *w* by first comparing [redacted] to alternate measures of the outside option of [redacted] As we explained in our Opening Report, the WALC represents an average loan price at the time of the transaction and there can be a wide dispersion of OTC prices around this mean. For this reason, we would expect to observe instances where the [redacted] price would fall outside the range of WALC P_1 and WALC P_2, and sometimes, the minimum and maximum OTC values (P_1 and P_2.) In the third and fourth columns of **Exhibit C.28** we also calculate "w" under two further methodologies we described in our Opening Report.[515] In the fifth column, we estimated *w* using a measure of

[514] McCrary Report, ¶ 142.

[515] The third column of the table above calculates *w* by taking the ratio of the difference between [redacted] loan cost and the WALC Level 1 price divided by the difference between the WALC Level 2 price and the WALC Level 1 price. That is, w = ([redacted] P – WALC P_1) / (WALC P_2 – WALC P_1) where [redacted] P is the loan cost of the [redacted] trades. The sample is restricted to cases where the [redacted] P is within WALC P_1 and WALC P_2. Using this sample, we calculate that the average w = [redacted] and w = [redacted] The fourth column of Table XI.15 shows the value of *w* computed as w = ([redacted] P – Min P_1) / (Max P_2 – Min P_1) where Min P_1 is the minimum Level 1 price and Max P_2 is the maximum Level 2 price. The sample is restricted to cases where the [redacted] price is between the OTC's Min P_1 and Max P_2. Using this sample, we calculate that the average w = [redacted] and w = [redacted]

central tendency, the median, which would not be skewed by extreme values in the Prime Broker Defendant Data. We continue to conclude that the most reasonable assumption for values for "w" given the facts and circumstances for this case is [redacted] and [redacted]

EXHIBIT C.28
ESTIMATES OF W USING [redacted] LOAN COSTS
COMPARED TO OTC LEVEL 1 AND LEVEL 2 PRICES

[redacted]

Notes: Updated [redacted] Dataset, Updated Prime Broker Datasets, and Updated Prime Broker Transactions Datasets.
[redacted] loan cost is compared to the minimum (Level 1) and maximum (Level 2) transaction prices and the WALC P1 and WALC P2 on Matched Days.
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APPENDIX D – WORK PAPERS

EXHIBIT D.1
MCCRARY REPORT APPENDIX EXHIBIT D.3, EXTENDED TO APRIL 23, 2012 – MAY 19, 2012

[redacted]

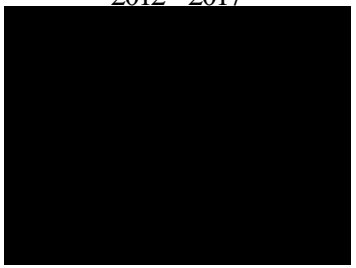
Notes: Prime Broker Transactions Datasets in our Opening Report, Prime Broker Locate Dataset, and McCrary Report Appendix Exhibit D.3.

EXHIBIT D.2
MCCRARY REPORT APPENDIX EXHIBIT D.2, EXTENDED TO FEBRUARY 14, 2012 – MARCH 9, 2012

[redacted]

Notes: Prime Broker Transactions Datasets in our Opening Report, Prime Broker Locate Dataset, and McCrary Report Appendix Exhibit D.2.

EXHIBIT D.3
AVERAGE DIFFERENCE BETWEEN LEVEL 2 AND LEVEL 1 WALC (BPS)
WEIGHTED BY LEVEL 2 NOTIONAL VOLUME
2012 – 2017



Notes: Updated Pooled Prime Broker Dataset, Matched Days